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TECHNIQUE FOR THE FILTRATION OF HUMAN PLASMA AND SERUM FOR TRANSFUSION

BY

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In the spring of 1940 arrangements were made to prepare liquid and dried plasma and serum for the Blood Transfusion Service of the Medical Research Council. The following is an account of the technique used for preparing liquid plasma and serum:

The blood is received in the M.R.C. standard bottles, which contain 20 c.cm. of 15% glucose in distilled water, 100 c.cm. of 3% sodium citrate in distilled water as anticoagulant, and about 420 c.cm. of blood (approximately 220 c.cm. of plasma and 200 c.cm. of cells). The method which is used to separate the plasma depends upon the time that has elapsed between bleeding the donor and arrival of the blood: (*a*) if less than forty-eight hours old the blood is run through an Alfa-Laval separator; (*b*) if older, it is allowed to stand for five days at 4° C. and the plasma is siphoned off by special apparatus, described below. The pooled plasma, derived from blood of appropriate groups, has normally a low agglutinin content (Loutit, 1941; Della Vida and Dyke, 1941; Jakobowicz and Bryce, 1941).

Separation and Collection of Plasma, using an Alfa-Laval Centrifuge

The separator is an Alfa-Laval Vickcen Type 50 machine. The bowl has a speed of 7,800 r.p.m. and a capacity of one pint, and is arranged so that cells and plasma are discharged continuously.

Assembly of Bowl.—This is carried out according to the instructions issued with the machine for assembly as a purifier. The size of the gravity disk is important, and the disk marked 0.95-0.98 is found to be the best, giving the highest yield of plasma consistent with negligible haemolysis.

Operating the Separator.—Blood of all groups is pooled in a 10-litre glazed earthenware vessel having a delivery outlet fitted with rubber tubing controlled by a screw clip. The machine is switched on and allowed to reach full speed. Citrate saline solution is led in until the bowl is full and the solution is issuing freely from the lower outlet. The citrate saline is then replaced by blood. (If blood is added to the empty machine without first introducing citrate saline much haemoglobin is present in the initial yield of plasma.) The rate of input is not critical, but 15 to 20 litres an hour seems to be optimal for a good yield of plasma containing few cells. The citrate saline solution is gradually displaced from the bowl and flows from the lower outlet with a small amount of plasma. After a short time this ceases, and diluted plasma begins to flow from the middle outlet. The plasma gradually becomes more concentrated as the citrate saline is displaced, and at the same time cells begin to issue from the lower outlet. From this point the process is practically automatic, although it is necessary to see that the small clots which occur even in fresh citrated blood do not accumulate and obstruct the rubber tubing or the strainer at the top of the machine. This would stop the flow and cause haemolysis on resumption. If the machine is stopped for any reason it must be taken to pieces, cleaned, and refilled with citrate saline to avoid excessive haemolysis when blood is run in. Up to 40 litres of plasma has been separated in a single run, though a better product is obtained if the limit is 20 to 25 litres. It is unlikely that larger outputs will be required, but if they should be necessary a larger machine might be employed. The separated plasma contains a few red cells, which are removed at the next stage of the process. A small amount of free haemoglobin—usually 1 to 2 mg. per 100 c.cm.—is also present, and is enough to tinge the plasma, although it is clinically insignificant. Almost the theoretical yield of plasma is obtained—i.e., 65% of the volume of diluted blood.

Although all parts of the Alfa-Laval separator which come into contact with the blood are thoroughly cleansed no attempt is made to sterilize them. The plasma must therefore be sterilized by filtration as soon as possible after separation.

Collection of Plasma by Siphon Method

Blood more than forty-eight hours old on arrival is left to stand for five days at 4° C. and is then removed carefully from the refrigerator without disturbing the cells. Bottles showing excessive haemolysis or lipoid material are worked up separately; as a rule the filtered plasma from these bottles is usable, although some of our batches have become opalescent on standing and have had to be discarded. The plasma is siphoned off from each M.R.C. blood bottle, using the apparatus shown in Fig. 1.

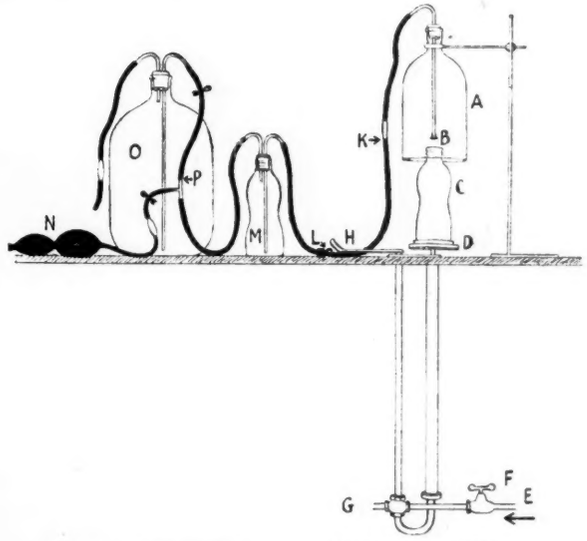

FIG. 1.—Apparatus used to siphon off the plasma.

A is a Winchester bottle with the bottom removed and the broken glass edges filed smooth. When in use it is held in position by a clamp round the neck. The rubber bung carries a length of glass tubing, to the lower end of which is fixed, by a rubber band, a metal disk, B, with three legs (like an inverted three-legged stool). This ensures that suction of the plasma is applied horizontally, thus enabling the operator to withdraw the plasma to within 3 to 5 mm. of the cells. C is an M.R.C. blood bottle

containing citrated blood and resting on a shelf, D, which is raised and lowered by means of a hydraulic lift. E is the main water supply to the lift. When the regulating valve F and the hand-operated tap H are both open the water runs to waste at G, and the piston is not raised. On closing tap H the piston carrying the shelf and bottle rises, and when H is again opened piston, shelf, and bottle are lowered. The apparatus allows of a perfectly smooth elevation of the bottle, and the lift can be controlled to a few millimetres. L is a spring clip which is fixed to the bench and controls the vacuum. M is a blood bottle used as a trap, and N a hand bellows which, by the manipulation of clips, enables pressure to be applied and thus reverses the plasma flow. If cells are accidentally drawn up past the disk B they can be returned by bringing the bellows into use. The inclusion of cells with the bulked plasma in the 10-litre collecting bottle O is thus avoided.

All apparatus in contact with the plasma is sterilized in the autoclave. For sterilization the suction dome with attachments is disconnected at K, which is fitted with a cotton-wool and parchment cover. A loose parchment cover is also placed over the dome. K to P constitutes a second section, and the 10-litre collecting bottle and its attachments, including a siphon cotton-wool filter, a third section. For convenience the entire "bulking" apparatus is thus sterilized in three parts.

Clarification of Plasma

To facilitate Seitz filtration the plasma is clarified by passing through a specially prepared filter of cotton pulp which removes the fat and the majority of bacteria, etc. The pulp filter is prepared by finely shredding 1 lb. of English "perfecta" pulp into 10 litres of water at approximately 50° C. and beating to a smooth suspension. The apparatus used for pulping consists of a double Winchester quart bottle (4-litre) with the bottom removed. The bottle is inverted and supported in an iron stand, one side of which is a gate for easy assembly. In preparing the filter a layer of zinc gauze (similar to desiccator gauze) is first placed in the inverted bottle. The next two layers consist of large round pebbles about 2 cm. in diameter. Additions of the soaked pulp are now made, the first of these consisting of enough pulp to cover the pebbles to a depth of 2 cm., enclosed in muslin and packed tightly on top of the pebbles. Moderate reduced pressure from the vacuum line or a water-pump is applied (through a rubber bung in the neck of the bottle) when the first addition of pulp is being made, and is maintained until the filter is ready for sterilization. When the pulp–muslin layer is completed the remainder of the pulp mixture is then added in three or four amounts. Tight packing of each addition is facilitated by means of a beater, consisting of a large rubber bung on the end of a stick, and care must be taken to ensure that there are no leaks down the side of the glass container. To avoid separation into distinct layers during sterilization it is important to keep the pulp wet during preparation.

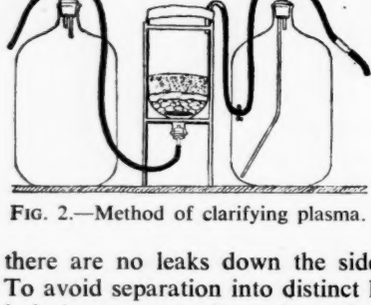

FIG. 2.—Method of clarifying plasma.

When the filter is complete the total height of the pulp is usually about 10 cm. Distilled water is drawn through the pulp to wash it thoroughly, and the whole apparatus is then sterilized by autoclaving for half an hour at a temperature of 121° C. and a pressure of 15 lb. per sq. in. During autoclaving and until the filter is required for use, the open ends of the apparatus are covered loosely by parchment.

Immediately before use about 500 c.cm. of sterile citrate saline solution (1% sodium citrate and 0.85% sodium chloride) is passed through the pulp. The plasma is then drawn through by suction, which is gradually increased, the filtrate being collected in sterile 10-litre bottles (Fig. 2). About 8 litres come through in half an hour, the negative pressure not exceeding 120 mm. Hg. About 30 to 40 litres of plasma can be passed through one preparation of pulp.

Sterilization of Plasma

Sterilization of the plasma presents a problem to which no satisfactory solution has yet been found. Filtration appears to be the only safe and practical method, but is a process that introduces its own special difficulties. The use of filter candles on a large scale is impracticable, since the plasma tends to clot during filtration and the interstices of the filters become blocked. The asbestos-pad filter allows the filtration surface to be renewed when necessary, and this type of filter was adopted. It has been found that fibrinogen is completely removed from the first sample of filtrate, but is present in later samples. Prothrombin is removed from a much larger volume, and when it finally passes the filter the filtrate clots spontaneously in the absence of ionized calcium. Therefore only a limited volume of plasma per unit area of filtration surface can be produced without fear of later clotting. Bushby and Whitby (1941) have found that clotting by filter pads is due to their asbestos content, a factor that unfortunately cannot be eliminated, as it is on this that the sterilizing qualities of the pads depend. The method of removing the prothrombin from the pads by washing with a solution of caustic soda (N/30) and sodium citrate (Bushby, Buttle, and Whitby, 1940; modified by Stanbury—method unpublished) has given unsatisfactory results in our hands, for reasons probably connected with the fact that the plasma we deal with is usually old.

By careful attention to the amount of plasma allowed to pass through the filter the difficulty of clotting can be largely overcome, though eventual clotting of some samples after several weeks has been observed. The underlying reasons for the clotting are extremely interesting, and it is hoped to publish the results of this study at a later date.

The following method, though expensive in pads and labour, gives a satisfactory sterile final product, which, provided it is kept at ordinary room temperature (above 12° C.), does not clot readily. Lower temperatures have the curious effect of hastening coagulation.

A multiple-plate Seitz "pilot" or "British" filter press is assembled in the normal way. The plates are numbered and should be in their correct order, with pads (Seitz EK or Ford's SB 20 by 20 cm. "sterilmats") between them. Eight or more pads may be used for each filtration.

Sterilization of the Seitz Filter.—This is carried out by autoclaving for half an hour at 121° C. and 15 lb. pressure per sq. in. For this operation the filter is correctly but loosely assembled, and all the ports are left open so that there can be free passage of steam between the filter pads and plates and through the ports. As soon as the autoclave is opened after sterilization the filter is tightened and the ports closed. About 10 litres of sterile citrate saline solution are now run through the filter via the inlet. This cools it very rapidly and prevents the formation of a vacuum, which would result from condensation of the steam, with the consequent risk of contamination by air leaking in.

Seitz Filtration of Pulped Plasma.—Up to three filtrations a day can be done with a single filter press. In practice it is convenient to have two filters, which are used alternately throughout the day. While one filter is in use the other is being sterilized. When required for filtration about 18 litres of plasma is placed in a tin-lined copper pressure-vessel connected to the filter press by rubber tubing. The cap over the outlet valve of the press is removed, and the outlet is connected, with aseptic precautions, to two sterile 10-litre bottles. The plasma is forced into the filter by air pressure of approximately 9 lb.

per sq. in., applied through the compressed-air line installed throughout the plasma laboratories. The remainder of the citrate saline solution used for cooling the filter comes through first and is collected in one of the 10-litre bottles. As soon as plasma begins to come through the outlet is connected with the second bottle, a third sterile bottle being substituted for the one containing citrate saline solution. About 8 litres of plasma is collected in each bottle. Two to three litres remains in the filter, and is blown out and included in the next batch.

The whole operation must not take more than twenty minutes, and not more than 16 litres can be passed through 14 pads if clotting of the plasma is to be prevented, although this amount represents only 3 c.cm. of plasma per sq. cm. of filtering surface.

Bottling the Filtered Plasma

A sterile siphon is fitted to the 10-litre bottle A, containing the plasma (Fig. 3). The plasma is filled into M.R.C. blood bottles, B, using air pressure at about 2 lb. per sq. in. (When using large glass vessels—e.g., 10-litre bottles—under pressure or vacuum, it is advisable to enclose each vessel in a strong wooden box.) Each of the M.R.C. bottles containing 10 c.cm. of citrate saline solution is autoclaved with the metal cap screwed down tightly. Details of the method of sterilization are given below. In readiness for filling, the cap of each bottle is removed in turn, the neck is flamed, and the bottle is placed immediately under the dome C, in such a way that the disturbance of air is minimal. The spring clip controlling the flow of plasma is then released, the bottle is filled, the neck is again flamed, and the cap is replaced.

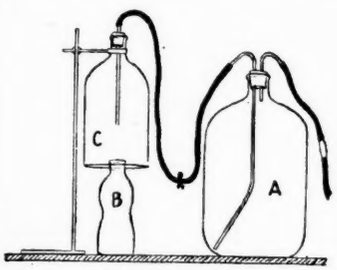

FIG. 3.—Method of bottling the filtered plasma.

The construction and the sterilization of a dome or hood with its attachments have already been described. Apparatus of this type is very effective in preventing contamination of filling-nozzles and of the contents of opened bottles.

Sterility Tests on Human Plasma

For many months samples were taken for sterility tests at the start and the end of filling M.R.C. bottles from each 10-litre bottle. Each sample was tested aerobically and anaerobically, using glucose broth and meat broth respectively. Approximately 1 c.cm. of plasma was added to about 300 c.cm. of culture medium. The inoculated bottles of culture media were incubated at 37° C. for five days and inspected daily. Stained films were made from any bottles not remaining clear. In addition to the above sterility tests, every bottle of plasma was incubated for five days and examined during and at the end of this period. This provided a check on the sterility, since the plasma which remained clear was probably sterile.

It was eventually decided that the sterility tests were of little value, because it was found that in several cases a high proportion of the bottles of plasma were obviously contaminated after five days at 37° C. despite the fact that no organisms were detected in the samples taken for sterility tests. It is now our practice to fill the bottles with plasma as soon as it has been filtered and to seal them immediately with a viscap; the latter step was adopted when it was found that air could pass in and out of some of the bottles despite the apparently undamaged condition of the screw cap and rubber liner and the fact that the cap was screwed down tight. The plasma is then incubated for five days at 37° C. and inspected daily, an operation which is facilitated by strip lights at the back of the shelves in the incubator. After removal from the incubator the plasma is stored at room temperature for fourteen to sixteen days, and inspected frequently. In this way it is possible to detect and eliminate contaminated bottles whether the organisms grow better at 37° C. or at a lower temperature. Occasionally a whole batch is found to be contaminated, but in general the amount of plasma lost through contamination is small.

Some Practical Details of Sterilization

The open ends of all tubing and other apparatus are covered with cotton-wool protected by parchment paper held by rubber bands. Blood bottles are prepared for use by washing with hot water and soap. After a thorough rinsing under the tap they are finally rinsed with distilled water, and 10 c.cm. of citrate saline solution (1% sodium citrate and 0.85% sodium chloride) is added.

For many months it was our practice to sterilize the bottles with the caps loose and covered with parchment paper. After autoclaving, the bottles were allowed to cool in the autoclave and the caps were screwed down as the bottles were removed. This method is efficient but rather time-consuming. Recently we have carried out a number of tests to check the efficiency of different methods of sterilizing bottles. 10 c.cm. of broth heavily contaminated with hay dust and *B. subtilis* spores was added to each of a number of blood bottles; these were divided into three groups. Some were plugged with cotton-wool, others were loosely capped and covered with parchment, and the third group had the caps screwed down tightly. All these bottles except two controls were autoclaved, and then incubated for five days at 37° C. and kept for a further sixteen days at room temperature in accordance with our routine procedure. In no instance was there growth in autoclaved bottles, while the control bottles gave copious growth overnight.

In consequence of these tests we now sterilize the bottles with the caps screwed down tightly. This effects a considerable saving of time and autoclave space, as the bottles can be removed before they are cold. A few bottles are found to have a vacuum inside, and these are discarded on account of the risk of contamination on opening. The method described above is very useful for checking the efficiency of other sterilizing processes, wet or dry. For example, we have applied it with satisfactory results to 10-litre bottles and siphons used in filling serum or plasma.

The 10-litre bottles are sterilized by a method similar to that used for blood bottles. 50 c.cm. of citrate saline solution is added to each bottle before sterilization, and the necks are plugged with non-absorbent cotton-wool and covered with parchment.

In autoclaving apparatus it is usual to pass free steam for twenty minutes and then to increase the pressure to 15 lb. per sq. in. (temperature 121° C.), which takes about ten minutes. The pressure is maintained at 15 lb. for thirty minutes, after which the autoclave should be left for at least another hour to cool. Immediately after removal from the autoclave all sterile apparatus is labelled with the details of sterilization. This prevents mixing with unsterile material. It is also advisable to keep records of the contents of the autoclave during each run and of the times of sterilization.

Immediately before the bottles are passed into the sterile filling-room they are swabbed with 0.5% phenol in water.

Preparation of Blood Bottles for Issue.—When the bottles of plasma have passed sterility tests they are labelled with (1) the batch and bottle number and date of filtration; (2) a warning in red not to store at a low temperature—a condition which favours the clotting of plasma once it has been filtered.

Preparation of Human Serum for Issue

Recently plasma has been largely replaced by serum, which is in some ways easier to handle, as clotting should not occur ; hence the amount which can be passed through a filter in a single run is much larger. Delayed clotting does happen in some samples, however, and is a source of much trouble during filtration.

The serum is separated by various methods at the depots, the average yield being about 40% of the blood volume. The pooled serum is passed through a pulp filter and a filter press in the same way as described for plasma, with the important modifications that two sterilizing pads are used between each plate of the filter press, that a batch consists normally of 80 to 100 litres, and that a pressure of not more than 4½ lb. per sq. in. is employed to force the serum through the press. As filtration can be carried out more slowly than for plasma, the serum is filled aseptically straight from the filter through two hooded pipettes. The rate of flow through the filter can be adjusted to a speed convenient to two fillers.

We are at present trying various modifications in this technique, including the use of clarifying pads in place of the pulp, and also of a pressure pulp with a very much larger surface area. The clarifying pads or the pulp precede the sterilizing filter and are connected in series with it, making the whole process continuous in an almost closed system and reducing the risk of contamination.

After every fifteenth bottle is filled a sample of serum is taken and tested for sterility by the method described for plasma. In the event of contamination of one or more bottles the tests are repeated on other bottles from the batch ; the bottles are numbered in sequence, and the next bottles in the series are usually taken for sterility tests. If this second test also shows contamination the entire batch is discarded. It is unwise to re-filter the serum, as soluble bacterial toxins may be present which might produce undesirable reactions on injection.

It has been found undesirable to incubate all the bottles of serum, as this causes some change in the lipoid distribution, leading to a slight cloudiness in the serum on subsequent storage. Incubation at 37° C., which is used for plasma, is therefore replaced by storage of the serum at room temperature for three weeks before issue. In our experience serum is more difficult than plasma to obtain sterile, but so far we have been unable to discover the reason. Another difficulty in the case of serum is that a number of bottles of serum, though sterile, showed changes varying from a slight deposit, detectable only by careful inspection in a good light, to general opalescence and even precipitation. It is extremely difficult, by visual inspection, to differentiate this phenomenon from contamination. The cloudiness generally begins to develop after about fourteen days, though it has been observed after much shorter and much longer periods.. This problem is at present under investigation. The evidence so far points to the cloudiness being due to soaps apparently formed by the splitting of fats by serum lipase followed by combination with the calcium present.

The batch number and filtration date are entered on the issue label, which is affixed to all bottles of serum when the results of sterility tests are known.

Premises and Staff

The ground floor of a building 60 ft. by 40 ft., with an annexe 18 ft. by 15 ft., has been adapted for the preparation of plasma and serum for issue. There are pressure and vacuum lines in the processing-rooms. A large readily accessible incubator and cold room and abundant accommodation for storage at room temperature are essential for the efficient working of the unit. The annexe contains three autoclaves and one steam sterilizer. Rooms for filling and other sterile work are fitted with large hatches with inner and outer doors, through which sterilized equipment can be passed into the room without using the normal entrance ; air currents carrying bacteria into the room are thus avoided. The floors and benches of any room in which sterile manipulations are carried out are kept moist during the period of work, so as to allay dust. The bacterial content of the air is further reduced by the use of a "dynalysor" or other mist spray in the neighbourhood of the operation. Windows and, so far as possible, doors are kept shut. Outside the doors are placed mats in trays containing weak antiseptic to reduce the numbers of organisms carried in on the special canvas slippers worn by the staff. Only workers experienced in sterile manipulations are permitted in these rooms, and they change into sterilized gowns, caps, and slippers before entry ; where possible a small ante-room should be used as a dressing-room. Hands and forearms are washed thoroughly. Transparent masks are comfortable to wear over nose and mouth, and are of considerable value in preventing droplet infection ; the type which is bent backwards under the chin has the advantage that it presents a mechanical barrier to spray directed downwards as well as forwards.

Records

It is essential that a very complete record of every manipulation should be made at the time, and that all entries should be initialled by the individual responsible. Cards with headings of the information required are an advantage for ready reference, and they may be cross-checked with the details recorded in notebooks. The data considered important will of course vary from time to time. Thus, for many months prothrombin and protein estimations were made for every batch of plasma ; but these examinations showed little variation between different pools, and were discontinued.

Bacteriological Notes

A few hundred bottles of blood have been examined for sterility on arrival from the depots. The contamination rate has varied from about 5 to 25% in different series : the former is probably a representative figure for present-day conditions of working with improved technique.

When the serum is withdrawn at the depots it is sent to us in Winchester bottles. As is inevitable, a small proportion of these bottles have become infected : the contamination rate during the past two months has been approximately 1%. As it is possible that some of the organisms present produce soluble toxins, we now examine all bottles for sterility and use only serum or plasma which is either sterile or only very slightly contaminated. The contaminants found in plasma and serum before filtration are various cocci and coccobacilli, and occasionally organisms of the *B. subtilis* group, *Pseudomonas pyocyanea*, diphtheroids, yeasts, and moulds.

It is unfortunate that the ideal preservative for plasma and serum has not yet been found (MacKay, 1941). Phenol and its derivatives are out of the question, as they are too toxic when several pints of plasma or serum containing antiseptic have to be injected. Merthiolate 1 in 10,000 is relatively non-toxic and does not affect serum proteins, but it does not prevent the growth of *Ps. pyocyanea*, which has appeared in filtered plasma on four occasions. Other organisms, including various cocci, coccobacilli, and moulds, have also grown after an interval in the presence of this antiseptic. Merthiolate is therefore regarded as untrustworthy, although undoubtedly it has considerable bactericidal and bacteriostatic properties. Its presence

must not be allowed to give rise to a false sense of security, and every possible care should be taken in handling material containing it.

Summary

Methods used for the production of human plasma and serum on a large scale are described.

Plasma is separated either by an Alfa-Laval separator or by suction after the cells have settled. It is then pooled in 10-litre bottles for convenience in handling.

Serum is separated by various methods at the blood supply depots and is sent to us in bulk for filtration and bottling.

The plasma and serum are clarified by passage through sterile paper pulp and are then sterilized by Seitz filtration.

Technical details are given of the methods employed to prevent contamination during the various stages of preparation and to ensure sterility of the final products.

Methods similar to the above have been used in and described from various laboratories. In the early days of the work information was freely exchanged between Dr. R. I. N. Greaves, Dr. W. S. Stanbury, Colonel L. E. H. Whitby, and ourselves, and it is impossible always to establish where particular processes originated. Bushby and Whitby (1941) have published an account of a similar procedure, but it was thought that a description of our methods might be of interest.

Our thanks are due to Dr. C. G. Anderson and Mr. J. G. C. Campbell for their helpful suggestions and criticism.

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THROMBOCYTOPENIC PURPURA COMPLICATING ARSENOBENZENE THERAPY

BY

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Blood dyscrasia complicating arsenobenzene therapy, may, according to McCarthy and Wilson (1932), belong to one of three groups—the thrombocytopenic, the granulocytopenic, and the aplastic. While borderline cases do occur, haematological examination usually permits the placing of any particular patient with symptoms of blood dyscrasia in one of these three categories. Such classification is not merely of academic interest, but points the way to correct treatment and sound prognosis. This paper, in addition to recording another case of arsenical thrombocytopenic purpura, seeks to assess the present-day position of this serious complication of antisyphilitic treatment.

Case Report

The patient, a well-developed man aged 30, started antispecific treatment on April 9, 1940, at which time he presented clinical evidence of early secondary syphilis, the Wassermann reaction and Kahn test being positive. The first course of treatment was irregular, and by July 25 he had received only three intravenous injections of neoarsenobenzene, five intramuscular injections of sulpharsenobenzene (total 5.4 grammes), and four injections of a bismuth preparation. The second course was started on November 13, at which time the Wassermann reaction and Kahn test were still positive. During this course he received six weekly injections of sulpharsenobenzene intramuscularly (3.45 grammes) and 1.4 grammes of bismuth, the last injection being administered on December 27. On reporting at the clinic on January 1, 1941, for treatment, purpura was noted, and on the following day he was admitted to hospital under my care.

On admission ecchymosis was widespread over the trunk and limbs, being most pronounced on the flexor aspects of the extremities and over the hip-joint areas. The purpuric patches varied from petechiae to large areas of ecchymosis, and there was a subconjunctival haemorrhage affecting the left eye. Blood was oozing profusely from the gums around all the teeth, and this may have accounted for the marked melaena noted in the stool on the following day. Gross haematuria was present, but there was no evidence of haemorrhages into joints or pleural cavities, nor enlargement of liver, spleen, or superficial glands. The temperature, pulse, and respirations were within normal limits. Apart from discomfort and inconvenience from the bleeding gums, the patient had no subjective complaint and felt well.

Treatment comprised rest in bed, a milk diet, abundant fluids, the juice of two oranges daily, and a mouth-wash of liq. ferri perchlor. every three hours. In addition, 6 c.cm. of 10% calcium thiosulphate solution was given intravenously on admission and repeated the following day. On January 4 the patient's condition remained unchanged, and 1,000 mg. of ascorbic acid was administered by the intravenous route. The next day the clinical condition was still unchanged, and daily injections of calcium thiosulphate were resumed. On January 6 improvement began, the haematuria and bleeding from the gums being noticeably less. It was obvious on the 7th that the purpuric manifestations were abating rapidly, and on the 8th the bleeding from the gums and the melaena had ceased. There was no haematuria on naked-eye examination. From this time no further treatment was given, and convalescence proceeded rapidly, with early fading of the purpuric areas. The subconjunctival haemorrhage remained stationary for a considerable time, but eventually cleared up completely. The results of various examinations of the blood are shown in the table.

Table showing the Results of Blood Examinations

	3/1/41	7/1/41	13/1/41	23/1/41	28/1/41
Haemoglobin ..	102%	88%	89%	96%	—
R.B.C. (millions) ..	5·18	4·17	4·33	4·19	4·85
W.B.C.	9,200	5,200	6,100	5,700	—
Platelets[1]	30,00	41,000	70,000	157,000	274,000
Bleeding time[2] ..	+ 15 min.	—	9·5 min.	3·5 min.	—
Clotting time[3] ..	3 min.	—	3 min.	—	—
Clot retraction at 24 hours ..	Almost absent	—	Normal	—	—
Capillary fragility[4]	—	—	30	—	8

[1] Estimated by the method of Evans (1928).
[2] Estimated by Duke's method.
[3] Estimated by the method of Lee and White.
[4] Expressed as the number of petechiae per unit area, at standard pressure and time.

Discussion

Aetiology.—The aetiology of the blood dyscrasias following arsenobenzene therapy is not yet clearly understood. In the granulocytopenic and aplastic groups impairment of bone-marrow function is obvious, but the actual mechanism responsible remains in doubt. All the arsenical preparations used in the treatment of syphilis contain a benzene radical, and the action of the latter in causing depression of the bone-marrow function is readily seen in chronic benzene poisoning. The prevailing view, which incriminates the benzene group, is supported by this analogy, but experimental evidence (Lancellotti, 1938; Montanaro, 1938) is inconclusive, and suggests that, although the arsenobenzenes can produce a small transitory depression of the haemopoietic tissues in animals, other factors, such as idiosyncrasy or sensitization, are necessary to bring about the agranulocytic or aplastic complications of antispecific treatment in the human being. Wheelihan (1928) has reported granulocytopenia in a child after treatment with an inorganic arsenical preparation (potassium arsenite), but in this case infection may have played an important part in producing the depression of bone-marrow function.

Purpura develops only after a considerable number of injections, which in many cases have been received at irregular intervals, and this has led to the view that some sensitization mechanism produces the increased capillary fragility. The influence of sensitization is well illustrated in the cases described by Falconer, Epstein, and Mills (1940), who administered very small doses of arseno-

benzene derivatives to patients who had previously shown signs of intolerance to these drugs. Purpuric manifestations resulted; the platelets decreased and then reappeared rapidly. This thrombocytopenic process was entirely uninfluenced by previous saturation of the patients' tissues with ascorbic acid. In contrast, Mu (1929), in a study of the immediate effect of neoarsenobenzene on the platelets of healthy people who had never previously received such a drug, failed to produce purpuric manifestations, although there was some depression of the platelet count. More recently, Scarborough and Stewart (1938) and Horne and Scarborough (1940) have demonstrated that the increased capillary fragility present in arsenical dermatitis and thrombocytopenic purpura is counteracted by treatment with vitamin P, but remains uninfluenced by ascorbic acid.

Incidence.—In 1940 Gorrie, in reporting a case of arsenical purpura haemorrhagica, stated that he had found 21 cases recorded in the literature since McCarthy and Wilson (1932) collected 79 cases and added 2 of their own. Blood dyscrasia following arsenobenzene treatment is probably more common than these figures suggest, as a proportion of cases may remain unrecorded, while in other cases of purpura the relation to arsenical therapy may be missed. A more accurate indication can be obtained from the figures of the Whitechapel Clinic, London. Burke (1940) states that out of 3,250 cases receiving treatment for syphilis at this clinic between 1934 and 1938, 13 (0.4%) cases of blood dyscrasia were noted, 10 of which were of the thrombocytopenic type. Cole *et al.* (1931) observed only 2 cases of purpura haemorrhagica among 1,212 patients treated with various arsenical preparations over a ten-year period.

Symptomatology.—The clinical picture varies with the severity of the thrombocytopenia. Mild cases may show only a few small petechiae in the skin and buccal mucous membrane; other cases may present more definite purpuric manifestations, as illustrated by the case reported above. Haematuria occurs only in the presence of severe thrombocytopenia. No mention of it is made in any of the 13 cases described in the reports of Burke (1940), Winter (1940), and McCarthy and Wilson (1932), but it was present in the case recorded by Gorrie (1940). Retinal haemorrhage is very rare, but has been recorded by Gorrie (1940), Scarf (1934), and Stigaard (1937). In the latter's case cerebral haemorrhage also occurred.

Prognosis.—The importance of determining the type of purpura in any particular patient is reflected in the varying prognoses of the different groups. The mortality rate in the aplastic group is high; 28 of the 34 cases reported by McCarthy and Wilson were fatal. In the granulocytopenic group reported by the same authors, 4 out of 12 died. It is evident, therefore, that the presence of depression of the bone-marrow function calls for a grave prognosis. In contrast the outlook in the thrombocytopenic group seems to be invariably favourable. McCarthy and Wilson (1932) tabulated 12 cases of this group, all of which recovered, and 13 other non-fatal cases have since been recorded. The manifestations of severe thrombocytopenic purpura may be so alarming that it is reassuring to know that the prognosis in such cases is uniformly favourable.

Treatment.—The elimination of residual arsenic from the body is a principle of treatment common to all three groups of blood dyscrasia. In addition to general measures for increasing the rate of elimination, clinical experience suggests that the intravenous use of calcium thiosulphate is beneficial, although Muir, Stenhouse, and Becker (1940) failed to find experimental evidence in animals to support this contention. Repeated blood transfusions and pentose nucleotide therapy may maintain life in the granulocytopenic and aplastic cases until the bone marrow recovers its haemopoietic function. Recent work (Scarborough and Stewart, 1938; Horne and Scarborough, 1940; Zacho, 1939; Todhunter *et al.*, 1940; Bell *et al.*, 1940; Scarborough, 1940) indicates that vitamin P is more concerned than ascorbic acid in maintaining normal capillary resistance, and treatment with vitamin P preparations may be regarded as almost specific for cases of arsenical purpura. During convalescence, anaemia resulting from the purpuric bleeding will require to be counteracted with iron therapy; in severe cases this object may be achieved more rapidly by blood transfusion.

The further antispecific treatment of cases following upon the occurrence of blood dyscrasia must be cautiously planned, and opinion hitherto has been unanimous in ruling out the further administration of arsenobenzene compounds. Goldberg (1939) reported the successful substitution of mapharsen in the antispecific treatment of a pregnant woman in whom previous therapy with neoarsenobenzene had produced agranulocytic angina. However, much more evidence will be necessary before such a course is likely to be generally adopted.

Summary

The three main types of blood dyscrasia which may complicate arsenobenzene therapy are mentioned, and the importance of this classification in relation to treatment and prognosis is emphasized.

A severe example of the thrombocytopenic type is reported, and the aetiology, incidence, symptomatology, treatment, and prognosis of this condition are discussed with reference to the available literature.

I am indebted to the officer commanding a military hospital for permission to publish this case, and to the D.A.D.P. for the laboratory investigations.

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The following are among the recently elected Fellows of the Royal Society of Edinburgh: Satish Chandra Das, M.B., lecturer in pharmacology, Robertson Medical School, Nagpur, C.P., India; Andrew Davidson, M.D., D.P.H., Chief Medical Officer, Department of Health for Scotland; George Henry Edington, D.Sc., M.D., F.R.C.S.; Daniel Lamont, M.B., F.R.C.S.Ed., surgeon, Glasgow Royal Cancer Hospital and Glasgow and West of Scotland Radium Institute, and assistant surgeon, Glasgow Royal Infirmary; Walter Michel Levinthal, M.D., bacteriologist to the Royal College of Physicians Laboratory, Edinburgh; James Macfarlane, M.B., D.P.H., Medical Liaison Officer, Scottish Office, London; Jocelyn Patterson, M.Sc., Ph.D., lecturer in biochemistry at Charing Cross Hospital Medical School; William John Brownlow Riddell, M.D., D.O.M.S., Tennent Professor of Ophthalmology, University of Glasgow; John Douglas Robertson, D.Sc., M.D., D.P.H., Courtauld Institute of Biochemistry, Middlesex Hospital; Joseph G. Tait, M.R.C.S., L.R.C.P., D.P.H., resident secretary in Scotland of the Pharmaceutical Society.

TREATMENT OF FRACTURED RIBS

BY

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It has long been evident that the usual routine method of treating simple fractures of the ribs by extensive strapping of the chest wall is most unsatisfactory. Relief from pain does occur to some extent, but it is never complete, and the strapping often proves uncomfortable, irritating, and sticky, becoming well-nigh intolerable in a few days.

The aim of treatment by this method is to secure immobilization of the chest wall. It is not clear, however, how strapping is expected to effect such immobilization. For one thing, the skin moves freely over the ribs, and strapping soon stretches, while the very mechanics of rib movement make it virtually impossible to immobilize one side of the chest only, as is usually attempted. It must be remembered that the muscles of normal respiration are functionally of the bilateral kind, and, in this connexion, Böhler (1935) points out the necessity of completely encircling the chest with strapping. As, however, ordinary individuals are not trained to breathe with the diaphragm alone (even though this may be theoretically possible), it seems clear that immobilization of a part or the whole of the chest wall is an ideal impossible of attainment.

A further point of vital importance, and one which is often overlooked, is that immobilization of the chest wall will result in insufficient aeration of the underlying lung. This may not be a very serious matter in a young person, but in the elderly it may predispose to a hypostatic pneumonia. These patients are of necessity confined to bed; the pain of the fracture stops them from moving about, and congestion at the bases may occur, while, in addition, sufferers from chronic bronchitis are unable to cough (in spite of strapping), and retained secretions may be an added factor adversely affecting the lung. Most patients will say that strapping helps them a great deal when first applied, but sharp pain still occurs if deep breathing, coughing, or a sudden movement be attempted.

Pain the Chief Disability

It is clear, therefore, that the chief disability is *pain*, and were there no pain at the site of a fractured rib none of the secondary effects would arise and, indeed, the fracture would be of no consequence (such complications as compound fractures, injuries to the lung, and haemothorax being for the moment excluded).

It has long been accepted that the severe pain of fractured ribs is due to the broken ends rubbing together. It is questionable whether this is altogether true. The ribs are very firmly held between thick powerful muscular layers, and the broken ends must be, to each other, relatively immobile. In other words, when a rib moves it moves as a whole, even if it is in two or more parts, swinging up and outwards rather like a bucket-handle. Watson-Jones (1941) has pointed out that any movement between the bone ends would result in non-union, but this is unheard of in the ribs. This does not imply that there is no *tendency* for movement to occur, and it is probable that pain arises as a result of the muscles resisting such movement.

In endeavouring to explain the origin of the pain it must also be remembered that the maximum pain, which is of a short sharp stabbing type, takes place under two conditions. One is full inspiration (hence, in a suspected case, the clinical test of asking the patient to breathe deeply) and the other is coughing. In full inspiration the ribs are raised and swung outwards and maximum *expansion* is occurring. In this position the tendency would obviously be for the bone ends to separate, and, conversely, in expiration they should be forced closer together. If, therefore, the pain were really caused by the bone ends rubbing together, it would be expected to occur not in inspiration but in expiration. It is well known, too, that in other parts of the body relief of pain occurs when the broken ends of a bone separate (e.g., by skeletal traction), and it does not appear that separation of the bone ends alone explains the pain at full inspiration. In coughing, too, the attempted expiration against the resistance of the glottis should also, on mechanical principles, tend to cause separation of the bone ends, probably in this case opening the angle between the fragments as well.

If the pain of a fractured rib be carefully analysed it will be found to consist of a combination of two different pains. One is a constantly present dull ache, not localized exactly to the fracture but extending upwards and downwards two or three spaces and backwards and forwards some distance. The second pain is the sharp stabbing pain already mentioned, produced by deep breathing and coughing. The intensity of the latter pain is such that the former is generally disregarded but is noticed if the latter be abolished.

The dull ache is probably due to the bruising of the tissues (including the bone) which occurs in a wide area around any injured rib, and the sharp pain may possibly be caused by muscular spasm, occurring whenever there is a tendency to movement, particularly separation, of the fragments. Such spasm may be the result of an intense effort on the part of muscle fibres around the fracture to prevent movement between the ends, or it may be due to the over-stretching of a group of muscular fibres attached to one of the fragments. It should be noted that only the tendency towards movement of the bone ends need be present: actual movement is prevented by intense local activity of the muscles, and it is this intense effort that produces the pain.

There is also the possibility of involvement of the intercostal nerve. It is unlikely to be caught between the bone ends, but it might become involved or pressed on by a localized haematoma. Such pressure is likely to be most pronounced in inspiration, when muscle activity in the locality would be at its highest. Nerve involvement may explain the radiation of the pain forwards and backwards in the same space.

The pleura must not be forgotten as a possible pain-producer. It is in close relation to the periosteum on the inner side of the rib, and must be bruised, if not torn, and have a haematoma superficial to it.

Treatment

It was Zoppi, in 1936, who first recommended the injection of procaine at the *site* of the fracture in a damaged rib. He pointed out that while strapping helped a great deal, morphine often had to be given as well to relieve pain. This produced the most undesirable effect of depressing respiration, with its attendant risks. Zoppi injected procaine at the site of the fracture, procuring immediate relief of pain, and the patient's ability to cough, move, and breathe deeply returned at once. Curiously enough Zoppi's idea was not taken up, but other writers had previously recorded the alcohol injection of the intercostal nerves posteriorly in order to anaesthetize a wider area for serious injury to the chest wall. Labat (1928) described intervertebral block, using procaine and alcohol; and Latteri (1933) described the alcoholization of intercostal nerves in therapy. Grieco, in 1937, and Rovenstine and Byrd, in 1939, were still using intercostal block with alcohol. They

were, however, employing the method not for simple fractures but for serious injury to the chest wall, involving several ribs. Zoppi recommended that the injection should be repeated daily, if necessary, to provide continuous relief from pain.

In determining to try the method, I felt that the disadvantage of frequent injections could be overcome by injecting an oily local anaesthetic solution—e.g., percaine in oil, proctocaine, etc. Although such a foreign body as oil might prevent bony union, yet in the ribs this would hardly matter.

Unfortunately, at the time the first case presented itself it was impossible (owing to war conditions) to obtain any oily local anaesthetic solution, and all that could be done was to inject about 7 c.cm. of percaine (1 in 1,000) in and around the fracture, which was in the sixth rib in the mid-axillary line. The sharp stabbing pain disappeared at once, thus confirming that it has its origin at the fracture, but the patient was left with the less localized dull ache. What, however, was really remarkable was that the sharp pain did not return although the anaesthetic action of the percaine could hardly have lasted more than twelve to twenty-four hours. The dull ache, however, persisted for about ten days. The patient was kept in hospital for a week after the injection and then sent home; he was back at work in three weeks.

The second case was that of an elderly woman, a sufferer for years from chronic bronchitis, who had had the fifth and sixth ribs on the left side injured in a car accident. Immediate relief of pain occurred after injection of percaine: she was able to cough freely, and this no doubt saved her from serious lung complications. She, too, was left with what she described as a "bruised" feeling all over one side of the chest, but the sharp stabbing pain never returned.

It seemed almost impossible that relief of pain could be so lasting after only one injection of a non-persistent local anaesthetic, and scepticism was felt until the same thing happened in other cases. Altogether I have dealt with about a dozen cases of simple fractured ribs in this manner, and all have responded in exactly the same way except that in three cases the injection had to be repeated once two or three days later and one case had to have three injections spread over a week; but it was never necessary to resort to an oily solution. It is to be remembered, however, that this is always available should the other method fail to provide continuous relief.

In treating fractured ribs by this method care must be taken not to overlook injury to other structures or the development of a pleural effusion or haemothorax. The latter occurred once in the series of cases under review, and was aspirated at the same time the injection was performed. More serious injury does not exclude local injection, for it must be remembered that the original use was for multiple rib fractures.

From the relief of pain by one injection at the site of injury it appears that some form of permanent change must take place. It is probably the relief of spasm, allowing the fractured surfaces to resume normal relations—perhaps the breaking of some form of vicious circle, as in Leriche's theory of sprains. Certainly it seems difficult of any other explanation.

Technique of Injection

A few remarks on the technique of the injection may be of value. A 10-c.cm. syringe is required, and two needles are useful although not essential: a fine one for making the preliminary skin wheal, and a larger one of the intramuscular type for the injection of the fracture region itself. The solution used in all the cases was a 1 in 1,000 percaine solution combined with adrenaline. Percaine has proved to be definitely superior to other local anaesthetics in my hands, particularly in fracture work. It was therefore used in these cases, but of course there is no reason why procaine or a similar drug should not be tried.

The site of the fracture is located roughly by the point of maximum tenderness along the affected rib or ribs. Too much reliance should not be placed on radiographs. In many cases they will not show a fractured rib, even when such a fracture is clinically present and can be felt. I have seen two such cases in which no definite fracture could be observed on the radiograph; but clear clinical evidence was present, and this was confirmed by feeling the fracture with the injecting needle. A haematoma entered by the needle does not indicate absolutely that there is a fracture, although such a haematoma is constantly present with a fracture. Often the injecting needle can clearly detect the fracture.

The site of injection having been chosen, the skin is cleaned and a little iodine applied. Scrupulous care must be taken with the preparation of syringes and needles, which should be boiled, and the anaesthetic solution must be taken from freshly opened ampoules. The danger, particularly in fracture work, of the use of the rubber-capped phial or bottle for solutions does not appear to be sufficiently realized.

A preliminary skin wheal is raised just in front of the fracture with the fine needle, and the larger needle pushed through the overlying tissues in a direction perpendicular to the skin. The needle is then inclined upwards and backwards and slid along the outer surface of the rib. (The obliquity of the ribs is surprising, and the needle must be directed upwards at quite a sharp angle.) Most fractures will be detected in this manner. When the needle is at the fracture site it may be found to have entered a haematoma (as evidenced by withdrawing the plunger), but as it is rarely possible to get the needle between the fractured ends, very often the haematoma will be missed. When the surgeon is satisfied that the needle point is on or in the fracture, about 5 c.cm. of percaine should be injected. The remaining 5 c.cm. should be placed around the rib at the site of the fracture. After the needle is withdrawn a small dressing of collodion should be applied to the puncture. Relief of pain will be found to be instantaneous if the injection has been properly performed.

Summary

A method of treating fractured ribs by a local anaesthetic is described which appears to be an improvement on the old method, and avoids some of its complications. Results of using it are given.

The disadvantages and failure of the old method of treating fractured ribs by strapping are mentioned.

The dangers and difficulty of immobilization of the chest wall are discussed, and the fact that the underlying disability is pain is pointed out.

The origin of pain in fractured ribs is discussed.

My thanks are due to Mr. N. C. Lake, surgeon to Hendon Cottage Hospital, for help and criticism in connexion with the use of this method of treatment on patients in this hospital.

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CARDIAC MASSAGE

BY

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The subject of restarting the heart's action by cardiac massage is of great interest and importance, and is one which is constantly recurring in medical literature. Hamilton Bailey's recent paper (*Journal*, July 19, 1941, p. 84) and the ensuing correspondence prompt me to record a series of 7 cases, in 6 of which I have had to resort to this procedure and which bring out certain points of interest and lead to certain definite conclusions. I cannot lay claim to anything like Mr. Bailey's extensive experience of 40 cases in over twenty years' surgical practice (*Journal*, August 16, 1941, p. 243), but these seven cases have occurred out of 3,500 operations of various kinds in the last twelve years, and approximately correspond to my number of "deaths on the table."

Case Reports

Case 1.—Spinster aged about 50, suffering from bilateral renal tuberculosis with secondary involvement of the bladder, giving rise to severe and continuous pain. Operation on October 31, 1939: presacral neurectomy under gas-and-oxygen and ether. While the sympathetic plexus was being dissected off the bifurcation of the aorta, the pulsations suddenly became slower and stopped. Almost at once a hand was pushed up under the diaphragm; the heart was felt to be motionless and dilated. After a few firm compressions against the chest wall, through the diaphragm, the heart started beating again—slowly at first (about 40 a minute), then gradually regaining its normal rhythm. (In this respect this case differed from the others I have seen; for, in these, when the heart started to beat again it did so at a greatly increased rate, generally from 120 to 180 beats a minute.) The heart had been stopped probably not more than one minute before it was restarted, and the operation was then rapidly completed. The patient made an uneventful recovery from the operation, which was successful in relieving her bladder pain during the remainder of the period she was under observation. At no time were there any signs of the effects of the temporary cessation of circulation on the nervous system.

Case 2.—Man aged 45; laparotomy for perforated duodenal ulcer on April 25, 1938, under spinal (percaine) and light gas-and-oxygen anaesthesia. After closing the peritoneum, and while suturing the muscle layers, the heart stopped beating and was inaudible on the stethoscope. The stitches were hastily cut and the abdomen reopened, and cardiac massage was started by compression of the heart against the chest wall, through the diaphragm. No response being obtained, an opening was made in the diaphragm behind the xiphoid process by rapid blunt dissection, and the thumb of the right hand was thrust into the pericardium in front of the heart itself. The heart was then rhythmically compressed between the thumb, in front, and the fingers, acting at the back through the diaphragm. The heart started beating about three and a half minutes after it had stopped, and took on a rapid rate, about 120 beats a minute, which was maintained for some hours after the operation. The man recovered after a stormy convalescence, complicated by pneumonia, and is alive and well now, so far as I know. He recovered consciousness about two hours after the operation, and at no time showed any signs of neurological disturbance.

Case 3.—Married woman aged about 50, with a previous history of addiction to alcohol and drugs. Operation on August 9, 1939, for severely comminuted fracture of the patella. Anaesthesia was induced with sodium pentothal and followed by gas-and-oxygen and ether. (Unknown to me she had had a preliminary injection of 1/4 grain of morphine.) The right patella was removed through a medial incision. While the final skin sutures were being put in respiration suddenly ceased and she rapidly became pulseless. After a minute or so I proceeded to open the abdomen by a midline incision extending from the xiphoid process downwards, and began cardiac massage, at first by compression of the heart through the diaphragm, and shortly afterwards by resorting to the method described in Case 2. The heart started to beat again seven and a half minutes after it was first discovered to have stopped; it was soon beating at about 140 beats a minute, and within two hours had practically recovered its normal rate. About ten minutes after the heart had restarted respiration was resumed and artificial respiration was discontinued. After the operation the patient did not really recover consciousness. On the fifteenth day following operation she died from bronchopneumonia, which became apparent two days before death. During this period she presented a most interesting clinical picture: for the most part she was comatose, but at times was very restless, muttering odd words and picking the bedclothes. Her reflexes were normal and her general condition quite good until the last two days. She swallowed soft food reflexly when it was put into her mouth, and cried out when painful stimuli, such as a pin-prick, were applied; defaecation and micturition were carried out reflexly. Her condition closely resembled that of the "thalamus animal" in which the cerebral cortex has been removed, the lower parts of the brain and the spinal cord apparently functioning satisfactorily, and we suspected that a massive thrombosis of the cerebral vessels had occurred. After death a necropsy, carried out by Sir Bernard Spilsbury, revealed that bronchopneumonia was the immediate cause of death; the heart was normal, and showed no signs of injury as a result of cardiac massage, and the small opening in the pericardium, beneath the xiphoid process, was closed by recently formed fibrous tissue. The brain appeared normal, and no macroscopic or microscopical changes were apparent; there was no evidence of thrombosis or embolism in any of the cerebral vessels.

Case 4.—Man aged 20, suffering from pituitary tumour. Operation on November 17, 1938. After induction of anaesthesia with gas-and-oxygen, novocain was injected into the scalp. Before the incision was started he stopped breathing, and shortly afterwards the heart ceased beating. There was some delay before the abdomen was opened and cardiac massage was begun—at first through the diaphragm and later by inserting the thumb into the pericardium. The heart started to beat again fifteen minutes after it had stopped; the pulse rate rose to 180 beats a minute, gradually falling to the neighbourhood of 100; and respiration recommenced about twenty minutes after the heart restarted. The patient never recovered consciousness, and remained in a comatose condition with periods of restlessness for twelve hours after the operation; his pulse then started to rise, and he died. Necropsy showed no changes in the brain other than those associated with the presence of the pituitary tumour; the heart was rather fatty and soft, but had been undamaged by the cardiac massage.

Case 5.—Man aged about 45. He had sustained a severe head injury, and developed left-sided Jacksonian fits due to a right-sided subdural haemorrhage associated with some degree of cerebral laceration. Operation on December 10, 1938, about twelve hours after the accident. A rapid right subtemporal decompression was attempted, no anaesthetic being used. His heart failed before the skull was opened; this was rapidly accomplished and decompression carried out. The abdomen was opened within a few minutes, and cardiac massage was started by the direct method. No response whatever was obtained. Necropsy showed no damage to the heart by massage.

Case 6.—Man aged 70, suffering from acute intestinal obstruction due to a large strangulated hernia. Operation on December 6, 1938, under spinal (percaine) anaesthesia. The hernial sac was opened and the bowel was found to be obstructed but not gangrenous; a large quantity of foul-smelling exudate was present in the sac. As the bowel was being reduced into the abdomen he lost consciousness and started to vomit, and the heart failed. The abdomen was opened, and cardiac massage was carried out without any response. Necropsy showed that intestinal contents had been aspirated into the larynx but had not reached the trachea or bronchi. Presumably the heart had stopped owing to a reflex acting through the recurrent laryngeal nerves.

Case 7.—Young man, operated upon in 1930 by another surgeon, tonsillectomy being carried out. While the second tonsil was being pulled forward in dissection the man was obviously very lightly under the anaesthetic. He suddenly collapsed, and the heart was found to have stopped. The abdomen was opened and cardiac massage performed by compressing the heart against the ribs through the diaphragm only. No response was obtained. I regard the cause of this man's sudden cardiac failure as again being due to recurrent laryngeal reflex while insufficiently anaesthetized, and I have seen a similar sudden cardiac failure occur reflexly when the mesentery was pulled upon in a patient not sufficiently under. The failure of cardiac massage was presumably partly due to the delay in initiating it and partly because it was inefficiently carried out.

Commentary

It seems that sudden heart failure during operation may be attributable to one of two causes. In the first group the heart has failed as a terminal event in a mortal illness, such as late intestinal obstruction, general peritonitis, and any operation in the emaciated and aged. Cases 5 and 6 belong to this group, and in my view nothing one can do would revive the heart. In the other class of case the heart has presumably failed either owing to reflex inhibition or possibly as a result of the toxic action of the anaesthetic agent, and in these cases cardiac massage is generally successful in initiating the heart-beat, and should be resorted to at once.

The ultimate benefit depends entirely on the interval of time between the heart's cessation and its restarting. It appears that the effects of temporary circulatory failure are due to some damage caused by the resulting anoxaemia on the most highly specialized cells in the brain—i.e., in the cerebral hemispheres. What this time interval is has been disputed. I have seen it put as high as ten minutes, but it would seem to be much shorter.

In none of my cases that have come to necropsy has there been any demonstrable change in the brain, either macroscopically or histologically; and Sir Bernard Spilsbury, who has done most of my necropsies, informs me that his experience has been the same in other cases. He also told me that he had on several occasions seen very severe damage to the heart and diaphragm caused by injudicious attempts at cardiac massage.

Below is a summary of the first four of these cases and of the one published in Mr. Bailey's paper:

Operation	Time before Heart starts to Beat	Effect on Nervous System	Result
1. Presacral neurectomy	Under 1 min.	Nil	Recovered
2. Perforated duodenal ulcer	3½ mins.	Not appreciable	,,
3. Epididymectomy (Mr. Bailey's case)	5½ ,,	Marked signs of damage to brain. Recovered consciousness in a few hours	Recovered (ultimately)
4. Removal of patella	7½ ,,	Very marked; lived 14 days in a "decerebrate state"	Died on 15th day without recovering consciousness
5. Cerebral tumour	15 ,,	Profound; never recovered consciousness	Died after 12 hours

The vital interval during which cardiac massage may be of avail is therefore between three and six minutes; after this it would seem to be useless. For this reason I think it cannot be too strongly urged that no time should be wasted in injecting adrenaline or coramine into the heart muscle, which, in any case, usually fails to get there; nor should time be wasted on more than the bare essential instruments required—which do not consist of more than a knife in the first instance, available during any operation. Nor is it necessary to appoint timekeepers, as Mr. Bailey suggests; for it is better to have a live patient, even if he has peritonitis or an infected abdominal wound, than a dead one after a well planned and executed operation.

It may take some courage to decide on opening the abdomen to massage the heart if one feels not quite sure; but during those few moments of procrastination the patient's chances of recovery are ebbing away at a speed only exceeded when he has an uncontrolled haemorrhage from a large artery. The mind has to be made up at once if any good is to be done.

The Operative Procedure

The operation I have carried out is simple, and I think it is to be preferred to that described by Mr. Bailey, who advocates dividing the attachment of the diaphragm to the ribs, and inserting the hand into the pericardium and compressing the whole heart in the hand. This procedure is bound to do much more damage, and takes longer to perform and to repair than the method I use. A rapid incision is made in the midline from the tip of the xiphoid process downwards for three to four inches. Such an incision generally exposes the front of the liver only. It should not be made too long, or the stomach and bowel may be extruded, thereby wasting time; but the incision must be large enough to admit the whole hand. Usually the peritoneum can be exposed in one cut. No haemorrhage to speak of occurs, as the circulation has ceased, and it is unnecessary to waste time picking up vessels. This can be done later if and when the heart has been restarted. The right hand is pushed up between the diaphragm and the liver, and the heart compressed against the ribs through the diaphragm. This should not be persisted in for more than a few seconds, as it is nearly always ineffective if the heart has really stopped. This method is inefficient because only the tip of the heart is compressed, and the organ tends to slip away upwards when compressed against the chest wall. The following procedure should be adopted at once: an opening is made with a knife or a pair of scissors just behind the xiphoid process, between the attachments of the two sides of the diaphragm. There is a soft avascular spot here, and no damage is likely to be done by this approach (which, incidentally, is an excellent method of effecting drainage from the pericardium also). The thumb of the right hand is thrust through this opening, and is now in the pericardium anterior to the heart. The heart is then compressed between the thumb, which acts by fixing the heart and preventing it slipping, and the fingers outside the diaphragm. The pressure should be rhythmical, at about 80 compressions a minute; if kept up for any length of time it is very tiring to the hand. When the heart starts to beat, it should be assisted for a few minutes until the beat is well established. What generally happens is that when the heart is grasped it is motionless, flabby, and dilated. After rhythmical compression for a varying interval, the ventricular muscle can be felt to start fibrillating. Shortly after this the heart as a whole begins to beat feebly. The heart-beat soon gathers strength, and proceeds at a considerable rate, until it gradually settles down into its normal rhythm. When the beat is well established the abdominal wall can be dealt with, and closed at leisure. It is quite unnecessary to suture the small hole in the pericardium. Artificial respiration should be proceeded with throughout the whole operation, and continued until natural respiration has been re-established.

I would emphasize again the extreme urgency of this condition, which may arise in any operation, however trivial. The point is that one must make up one's mind at once, and act with the utmost speed. Only if this is done is any good likely to ensue.

Medical Memoranda

Kohlrabi as a Source of Vitamin C

The kohlrabi is a vegetable which is not widely grown in Great Britain. It is described by Percival (1936) as a form of cabbage with a turnip-like stem that stands quite above the ground. It differs from the turnip in that the fleshy swollen part is developed from the stem above the cotyledons. No hypocotyl or root is present in it. It is therefore essentially a stem vegetable, although generally referred to as a "root" vegetable. It is regarded as a substitute for, though lacking the pungency of, a turnip. Green, white, and purple varieties are listed in most seed catalogues, and their cultivation presents no special difficulties. It is generally utilized as a cooked vegetable, but the raw grated stem forms an acceptable component of winter salads and is an especially rich source of vitamin C, as the Table below shows. For purposes of comparison, data for three other raw vegetables are included. The vitamin C was determined by titration of a metaphosphoric-trichloracetic acid extract of the material with 2:6-dichlorophenol-indophenol (Olliver, 1938).

Vitamin C Content of Raw "Root" Vegetables

	Vitamin C (mg. per 100 gm.)
Swede turnip	14
Hamburgh parsley	15
Turnip, var. Manchester market 1	18
" " " " 2	24
" " " " 3	20
" " " " 4	22
Kohlrabi, var. early green 1	47
" " " " 2	66
" " " " 3	52
" " " " 4	59

The kohlrabi is seen to be much richer in vitamin C than the other "root" vegetables tested (all of which are relatively good sources of vitamin C); in this respect it is comparable to watercress (average 61 mg. per 100 grammes—Olliver, 1940). About 3½ oz. of raw kohlrabi would satisfy the daily vitamin C requirements (50 mg.) of a normal adult person. The loss which might occur during cooking was not determined. Clearly we have here a source of vitamin C not appreciated before and unfortunately not available to most people.

Varieties of kohlrabi are often grown on a field scale for stock feeding, and so it should not prove difficult to organize a supply adequate to satisfy an appreciable part of our national vitamin C requirements during winter, when other sources (green vegetables and fruit) are not available.

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Cardiac Massage: Recovery

In view of Mr. Hamilton Bailey's recent plea for the earlier use of cardiac massage in cases of impending death under anaesthesia the following case may be of some interest.

CASE REPORT

The patient, a married woman aged 61, was admitted on October 23, 1941, with the history that about midday she had fallen in the house and sustained wounds of the scalp. On examination about four hours after the accident her general condition appeared to be good, her colour was good, and her pulse rate 70, with a strong and regular beat. The apex beat was normal and auscultation revealed no abnormality in the heart or lungs. The patient was slightly obstreperous. Examination of the motor power, tendon jerks, and cranial nerves detected no obvious lesion. There appeared to have been considerable haemorrhage from the scalp, and blood was still dripping away. There were minor bruises on the front of the chest. She was immediately transferred to the theatre.

Hexobarbitone soluble, 9.5 c.cm., was given slowly as prescribed. The patient stopped counting at 5 c.cm.; at 8 c.cm. respirations were observed to be moderately deep, but within thirty seconds of the administration of the total dose respirations and pulse failed simultaneously. The condition was one of white asphyxia, with complete absence of respirations, arterial pulse, and heart sounds.

The head of the table was immediately lowered, artificial respiration started, and coramine injected intramuscularly. As this produced no response a tracheal tube was inserted and oxygen given under pressure, whilst artificial respiration was continued and more coramine given. Timing of events was attempted until it was discovered that the theatre clock had stopped. About three minutes must now have passed, and it was decided to inject 30 minims of 1 in 1,000 adrenaline into the heart. This also produced no response. A left paramedian incision was made, the rectus muscle was split, and the right hand was inserted into the abdomen; the heart could be felt in firm contraction through the diaphragm. After a couple of squeezes against the chest wall it began to beat again, regularly and with increasing force. The arterial pulse returned; it slowly increased in volume, bringing a pink colour to her lips.

The scalp wounds still required attention. The head was shaved and a clean-cut laceration of the scalp was seen some 8 inches in length running over the crown. The skin was painted with tincture of iodine and haematomata were expressed from beneath the lacerated galea. No fracture was detected. After cleansing with saline the wound was powdered with sulphapyridine and one silkworm-gut stitch was inserted at the apex of the laceration, the skin edges being drawn into loose juxtaposition.

The patient was returned to the ward, the pulse then being 100 to 110 and of fair but variable volume. An intravenous plasma drip was set up, and two hours after collapse the patient was again conscious, though confused; her colour was fair but her pulse very weak. The pulse rate did not fall to less than 90 for several days, but was of good volume. There was moderate thin purulent discharge from the abdominal wound for a few days. The scalp wounds healed rapidly without infection; they were painted around daily with tincture of iodine and dusted with sulphapyridine. From the second post-operative day the patient received one ampoule of betaxan (vitamin B_1) daily, as there was a history of chronic alcoholism with attacks of dizziness and mental confusion over the past year. It appeared that she was probably intoxicated when she fell. Sulphapyridine, 1 gm. thrice daily by mouth, was also given for five days.

Convalescence was uneventful, and the patient was discharged on the twentieth day. When seen a fortnight later she was in excellent general health, the wounds were well healed, and the central nervous system was unaffected.

My thanks are due to Dr. J. L. Burn, medical officer of health for Salford, for permission to publish the case, and to the medical and nursing staff of the hospital for their efficient help.

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The National Institute of Industrial Psychology has just completed twenty-one years' work. Founded at the end of the last war for the study of the psychological aspects of occupational problems, the Institute has since, often under difficult conditions, carried out investigations in industry, and has advised some ten thousand young and older people on their choice of occupation. It has undertaken research both on industrial and vocational problems and has furthered interest in the subject by lectures and publications. The outstanding feature of the twenty-first year, however, has been increased general recognition of the principles which the Institute has advocated. This is reflected in the fact that the services of almost all its technical staff have been called for in connexion with work for the fighting Services. For the War Office and the Admiralty this work is in relation to the selection and allocation of recruits. For the Air Ministry the Institute has assisted with problems of gunnery and flying training. A section of the last annual report devoted to industrial work shows that the investigators have been busy with such questions as the recruitment and selection of operatives, methods of reducing absenteeism, and other matters affecting efficiency and morale.

Reviews

CONDITIONED REFLEXES

Lectures on Conditioned Reflexes. Volume 2. *Conditioned Reflexes and Psychiatry.* By Ivan Petrovitch Pavlov. Translated and edited by W. Horsley Gantt, M.D., B.Sc. (Pp. 199; 7 illustrations. 8s. 6d.) London: Lawrence and Wishart, Ltd. 1941.

As the title indicates, this is a volume of lectures given at various places and at various times from 1930 to 1935. It serves to complete the series, begun in Volume I, which goes back to 1903, and so provides an interesting historical record of the progress of Pavlov and his pupils in the field of conditioned reflexes, which field they created. As a faithful Boswell, Dr. Horsley Gantt has explained his Johnson to the English-speaking world, and he is to be thanked for it: the task can have been no easy one in any direction. It is a matter for regret that by far the greater part of the literature on the subject of conditioned reflexes is in Russian and that apparently (to judge by the translation) even that is written in a style too often vague and ambiguous. That the translations are accurate is not to be doubted, for the same atmosphere of vague generalization characterizes Pavlov's writings in French and German. The actual lectures in the present volume, therefore, leave the reader in some doubt as to the progress made by Pavlov in interpreting the data of psychiatry in terms of conditioned reflex phenomena. The disturbance of behaviour which came to be called an experimental neurosis, and which resulted from a conflict between excitatory and inhibitory processes in the cortex, formed the starting-point of the interpretation. Further work showed that beyond a certain intensity of conditioned stimuli the usual relation between stimulus and response became modified, so that strong and weak stimuli might produce equal effects, or weak stimuli might produce greater responses than strong ones, or excitatory stimuli might become inhibitory and vice versa. These observations provided data on which Pavlov built up theories of hypnosis, hysteria, obsessions, and paranoia.

Whether these tentative explanations are valid or not, only time and much further investigation can show, and such investigations can be made effectively only by workers well acquainted with the fields of psychiatry and of conditioned reflex study. The foundation for such consummation of Pavlov's work has already been laid in Russia by the creation of adequate research institutes for the study of the higher functions of the central nervous system.

One of the most valuable features of the book is the part contributed by the translator by way of introduction. It contains a brief outline of Pavlov's life and work and bears the imprint of the affection which all Pavlov's pupils had for their great master. The attitude of Pavlov towards the Soviet Government is particularly worthy of comment. Until 1930 he was openly and bitterly hostile to it, despite the encouragement it gave to his work; but by 1933 his attitude was modified, and by 1935 he was enthusiastically in favour of it, as is shown by his speech at Ryazan, his birthplace: "In our country the whole population honours science. . . . I would not be mistaken, I think, in saying that this is to the credit of the government at the helm of my country. . . . I raise my glass and drink to the only Government in the world which could bring this about, which values science so highly and supports it so fervently—to the Government of my country."

The seven illustrations are reproductions of photographs of interest in connexion with Pavlov's life, and include one of his home in the country, at Koltushy, now renamed Pavlovo, and one of a laboratory built for him by the Soviet Government.

GENERAL SURGERY, 1941

The 1941 Year Book of General Surgery. Edited by Evarts A. Graham, M.D. (Pp. 768. $3.00, or 16s. 6d.) Chicago: The Year Book Publishers; London: H. K. Lewis and Co., Ltd.

By enabling the busy surgeon with comparatively little expenditure of time or effort to keep abreast of recent developments, the *Year Book of Surgery* is always a boon to him, but the new volume will be of particular interest because it summarizes the developments which in this war have so far taken place in the treatment of gunshot wounds and their complications. It is gratifying to know that modern treatment of war wounds reduced the incidence of gas gangrene and streptococcal septicaemia to a surprisingly low figure; yet these were the main causes of death from wounds in the war of 1914-18. The importance of early wound excision and the uses of chemotherapy, pentothal anaesthesia, early plaster fixation, tetanus toxoid, and plasma are discussed so as to leave no doubt about their great value. German references are, however, comparatively lacking, and the reason is not far to seek. As the distinguished editor tells us in the preface, "The spirit of Science thrives best in an atmosphere of freedom. The withering influence of Nazism has now extended beyond the frontiers of Germany and has blighted all of the European continent." He also draws attention to the implication of this, that the responsibility of maintaining the progress of the science and art of surgery will for many years to come rest more heavily on the Western Hemisphere than formerly. We in these islands must likewise accept the challenge.

Among much else in this issue, the poor results of deep *x*-ray therapy on bronchiogenic carcinoma or so-called primary cancer of the lung are reviewed and should be seriously considered by those who unwisely recommend a preliminary course of *x*-radiation, and thereby lose valuable time before having recourse to surgical operation. The use of ethyl tri-iodostearate in place of thorotrast for arteriography appears to be an advance because it is completely eliminated in a few days and is not retained indefinitely in the tissues, as a radio-active substance, as is thorotrast. Ethyl tri-iodostearate contains 20% of iodine, and its contrasting effect is therefore good.

The points mentioned above are only one or two samples from a rich selection of recorded developments, and of enlightening editorial comments thereon, which are to be found in this yearbook. Surgeons everywhere will want to possess it.

BACK TO THE LAND

England and the Farmer. A Symposium by Viscount Lymington, Sir Albert Howard, C. Henry Warren, Adrian Bell, Rolf Gardiner, L. J. Picton, and Sir George Stapledon. Collected and edited, with an introduction, by H. J. Massingham. (Pp. 154. 10s. 6d. net.) London: B. T. Batsford, Ltd., 15, North Audley Street, W.1.

Back to the Country: How to Make a Living on the Land. By Frederick D. Smith, D.Sc., M.I.E.E., and Barbara Wilcox. (Pp. 221. 6s. net.) London: Adam and Charles Black. 1941.

Each of these books is stimulating and refreshing. They serve as an antidote to a machine-ridden world. In every continent, whether in the Forces or the factory, man is working furiously and overtime with the latest machine-made equipment. Factory and Forces are to be expected, but there is an ever-growing body of opinion which maintains that success in the field, not of war but of agriculture, can be achieved only by big-scale mechanization. Neither book aims to support this view.

In *England and the Farmer*, experts in turn are out to prove, in the words of the distinguished editor, H. J. Massingham, that "the machine-made life will not work; it ends as we are seeing it end—in chaos, massacre, and a

lunacy of domination by evil men." The policy of husbandry, soil fertility, the family farm, the value of humus as against artificial manures, crop rotation, the perils of "big business" methods, are some of the matters discussed. An abbreviated edition of Dr. Picton's contribution on Diet and Farming would be a refreshing change for the kitchen front. It would stimulate the public in their campaign of digging not merely for victory but for health. It would save fuel by his wise insistence on the value of raw food, and it would save drugs by lessening the curse of constipation. The book as a whole brings us back to Nature and will serve to encourage those, weary with war and other preoccupations, to find in the soil an inspiration and a healing.

Back to the Country: How to Make a Living on the Land is a handy guidebook to help the would-be smallholder on the practical side. Advice as to leases, soil, aspect, finance, crops, keeping of livestock—poultry, cattle, pigs—markets, and even neighbours, are among the many subjects dealt with. It might almost have been termed First Aid to the Land. The authors break off when most interesting, and one could have wished at times for greater detail. They do not paint an infallibly successful career for the beginner. On the contrary, one is reminded that a ceaseless battle is waged against pests, climate, and disease. But there is much in this book which should help to safeguard the uninitiated and the possibly light-hearted beginner. Perhaps Prof. Joad would have a theory as to whether agriculture conduces to philosophy or vice versa. Certain it is that the average countryman bears with equanimity most climatic disasters by observing that "what's bad for the corn is good for the roots." There is a mocking picture of a novice milking a cow on the wrong side. Customs die hard. But in America cows are frequently milked on both sides alike, as it is found that this ensures a better-shaped udder. A comforting reminder to those stirred to go back to the country is: "If you go along o' Nature, Nature 'll go along o' you, but if you try to go against her, she'll end by landing you in a devil of a mess."

ANAESTHESIA IN BRIEF

Aids to Anaesthesia. By Victor Goldman, M.R.C.S., D.A., Major, R.A.M.C. (Pp. 235. 5s.) London: Baillière, Tindall and Cox. 1941.

This new addition to the "Aids" series sets out the current views on this subject very concisely and is a useful reference book. The teaching tends to be somewhat dogmatic, as is usual in a handbook of this type—for instance, in discussing the use of intravenous barbiturates (p. 102) it is stated that the dose of hexobarbitone and pentothal is "up to 1 gramme." All who are familiar with these drugs will realize at once that dosage depends both on the type of patient and on the type of operation to be undertaken, so that in practice if pentothal is given as a total anaesthetic this dose is often safely exceeded. On the other hand, this recommendation may lead some inexperienced administrator to suppose that 1 gramme is a safe dose, an idea which would lead quickly, if put into practice, to disillusionment as a result of catastrophe, since many ill patients need much less than this amount for satisfactory anaesthesia.

There is a good chapter on vinyl ether, as would be expected from one so experienced in its administration as Major Goldman. His own work on the development of an inhaler for vinesthene is well known and much appreciated by anaesthetists, but it is a pity that he describes only this inhaler.

There is an appendix of useful information which should prove valuable for reference.

Notes on Books

The "Practitioner" booklet on *Disorders of Blood Pressure* (Eyre and Spottiswoode, 6s.) is an admirable and concise account of the present state of knowledge of the subject. Prof. G. W. Pickering deals with its significance, Dr. Shirley Smith discusses its measurement with special reference to life insurance, and Prof. John Hay describes the treatment of high pressure. Dr. MacAlpine writes on the cerebral manifestations of arterial disease, a subject he has particularly made his own, while Prof. W. W. D. Thomson contributes an excellent account of malignant hypertension, illustrated by photomicrographs. Dr. H. J. Starling discusses the rather neglected subject of hypotension. From these articles it may be seen that the three points on which most has been learned during the last decade are hypertensive encephalopathy, malignant hypertension, and the consequences of renal ischaemia.

Messrs. E. and S. Livingstone of Teviot Place, Edinburgh, have published a second edition of Miss LOIS OAKES'S *Illustrations of Bandaging and First-Aid.* A new feature is the rearrangement of the text and illustrations so that every method of bandaging described can be seen at a glance from start to finish. In response to many requests the "barrel" bandage for fractured jaw and the Thomas splint as used in first-aid posts are now included. We observe that the author now writes with regard to fracture of the spine: "It is important to note that a case of fractured spine is placed in the prone position, except when the fracture is in the cervical region, when the dorsal position is adopted." This small book is a very useful introduction to the art of bandaging, and its continued popularity can be foretold. The price is 6s., or on cheap paper 4s. 6d.; postage 6d. extra.

We have received a Russian publication entitled *Immunotransfusion for Burns,* by Dr. M. I. KANEKEVICH, with a preface by Prof. I. S. Kogana, and published by the Ukrainian Institute for Experimental Medicine. The book is available in the Library of the British Medical Association for those who can read Russian.

Preparations and Appliances

SULPHANILAMIDE PASTES

British Drug Houses Ltd. have issued two pastes containing sulphanilamide under the names of "sulphonamide-P B.D.H. paste (medium)" and "sulphonamide-P paste B.D.H. (stiff)." Both are supplied in metal collapsible containers like those used for toothpaste. The medium paste is a soft paste containing 30% sulphanilamide and 49% cod-liver oil; it is intended as a dressing for burns and superficial wounds, which after application should be left on for three or four days. The stiff paste is for use on gauze with which deep wounds are to be packed. It contains the same amount of sulphanilamide and about 60% of cod-liver oil.*

Sulphanilamide is absorbed from these pastes nearly as rapidly as when applied as a powder, and the absorption continues for three or four days. These pastes appear to be a most useful addition to the things used for local application to wounds, and combining as they do the bacteriostatic action of sulphanilamide, which because of its greater solubility is superior to the other sulphonamides for this purpose, with the protective and beneficial effect of cod-liver oil, they are likely to gain widespread use.

MULTIPLE VITAMIN TABLETS

The Organon Laboratories have now prepared tablets containing vitamins A, B_1, C, D, and the PP factor of the B complex. The tablets are sold under the name of "davitamon-five." The directions suggest two tablets daily, which would be a reasonable daily dose of vitamins A and D. The content of vitamins B_1, C, and of the PP factor, however, will be considered by many to be too low. Two tablets contain 100 international units of B_1 and 400 international units of C. The daily requirement for B_1 is considered to be 600 to 900 units, and of C is 1,000 units. The amount of the PP factor in two tablets is 1 mg., whereas the dose of nicotinic acid in the *British Pharmacopoeia* (Fourth Addendum) is 50 to 100 mg.

* See *British Medical Journal,* Nov. 15, 1941, p. 685.

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THE TEACHING OF ANATOMY

A former teacher of anatomy at Cambridge used to demonstrate in the lecture theatre the sciatic nerve with the remark, "This is the longest and strongest nerve in the body," an observation which was always greeted with loud cheers by the students present. The applause was redoubled when the lecturer continued by seizing hold of the femur and remarking, "And this is the longest and strongest bone." The laughter was not so much at the lecturer or his statements as an expression of relief that simple anatomical facts were being presented in a manner refreshingly free from detail. Were he alive to-day he would no doubt approve strongly of the letter signed by the five teachers of anatomy which was published in our issue of Feb. 7, and which has been followed since by correspondence that has been as pertinent as it has been interesting. The five teachers believe that the time allotted to topographical anatomy could be much shortened "by the elimination of the study of topographical minutiae which are unlikely to be of any practical value to the general practitioner." As one writer suggests, it may not be altogether easy to decide just what minutiae are unnecessary, but it is clear from the tone of the correspondence that such an obstacle is not to stand in the way of reform. Once a student has passed his second M.B. or its equivalent examination he does his best to forget the greater part of what he has learnt of descriptive anatomy, and it is only when he comes face to face with clinical problems that he begins to realize that anatomy is something other than a painful study of the formalinized dead. The learning of anatomy has, indeed, come to be regarded as a penance that has to be performed by the medical novitiate, and his attitude to the examination and the examiner is that of one who fully expects to have snares and gins prepared for his downfall. The root of the trouble is, as another correspondent points out, the "divorce" of the anatomist from his hospital and clinical colleagues and the fact that anatomy is not presented as a study of the living. Details of the origin and insertion of muscles tend to assume more importance than their function. What they are comes to be more significant than what they do. One obstacle in the teaching and learning of anatomy is to be found in the textbooks which the medical student proudly buys when he enters on his second M.B. course. The vanity of man is indeed expressed in the size of those two illustrious textbooks, "Cunningham" and "Gray"—books which seem partly devised to underline the invidious distinction that man draws between himself and the rest of the animal kingdom. These volumes should, as one writer puts it, be regarded as encyclopaedias. Valuable encyclopaedias of the human frame they are, but the undeclared suggestion that the medical student should memorize everything between the two covers of one or other of these volumes is something that has wrought havoc in his soul and has given him, with rare exceptions, a rooted distaste for the anatomy of man.

The five teachers make the important suggestion that one of the first steps to take in the reform of the curriculum is to remove from examination papers "the type of question which demands the memorization by the student of unnecessary topographical minutiae." If this simple move were agreed upon by all those who set examination papers in anatomy the ground would be cleared for the positive recommendations made in the five teachers' letter. A great load would be lifted from the student's mind, and he would have the time, interest, and energy to devote to those wider aspects of anatomy that make it such an entrancing study. In place of the unimaginative question that simply tests the squirrel-like capacity of the human mind, it is proposed to substitute "questions which demand a knowledge of the principles of the structural organization of the body and of the processes underlying development and growth."

The chief points made in the letter of a month ago closely resemble those made in 1921 by Prof. R. J. A. Berry in an article in this *Journal* (Jan. 15, 1921, p. 75) on the teaching and study of human anatomy. As he said there: "The human hand and foot, taught from a basis of evolution, embryology, and morphology, leading on to function, and through function to a loss of function —that is, disease—is an altogether more useful and profitable business than any mere collection of osseous articulations, muscular attachments, and relations of trivial arteries." In putting forward his conception of how anatomy should be taught—namely, as a study of the living—Prof. Berry in the same article went on to say: "Its teaching necessarily implies a wider vision than is to be obtained from the dissecting-room cadaver, and compels from the expert more general acquaintance with embryology, histology, biology, and anthropology. A knowledge of medicine and surgery goes without saying. In this conception of anatomy there is little room for petty details of structure, but there is an immense field for study, research, and quickened interest." The recognition that students should be given more instruction "on the post-natal growth of the body and its relation to internal, hormonal, and other factors" draws attention to another desideratum, and that is the correlation of anatomy and clinical work. A student would certainly learn more anatomy by spending one afternoon in the out-patient department of a hospital for nervous diseases or in an orthopaedic department than in a fortnight's reading of Cunningham. Another afternoon spent at an endocrine clinic would vividly illustrate to him the kind of approach to his subject that our five teachers recommend.

Just over twenty-one years have passed between the publication of Prof. Berry's article and the publication of the letter in our issue of Feb. 7, 1942. Something has, it is true, been done in the meanwhile; but it seems clear that the roots of the evil have not been dug up. Only the barest pruning of an overgrown shrub has been attempted. Are we to wait another twenty-one years for another correspondence to be started in these

columns, setting forth to all intents and purposes the same suggested set of reforms? What obstacles are there in the way of starting next year the one reform that seems to us to clear the way for the others—namely, the elimination from examinations of questions based upon a knowledge of unnecessary detail?

GONADOTROPHINS AND OVULATION

The production and discharge of ova are the main functions of the ovary; its other activities may all be considered as subsidiary ones which encourage the fertilization of the discharged ova and their subsequent implantation and development in the uterus. In women, as in most animal species, it is difficult to determine without operative inspection whether or not ovulation has occurred, but at least two fairly dependable methods have come into practice. It is possible to gauge the functional state of the ovary by endometrial biopsy: if the uterus is in the proliferative phase it is safe to assume that the ovarian follicles are still ripening and the uterus is under the influence of the oestrogens which they make; if the uterus is in the secretory phase, then corpora lutea must be present and progesterone is being secreted. In these conditions it is assumed that ovulation has taken place. A further method demonstrating the presence of functioning corpora lutea is by urine analysis for pregnanediol glucuronide. This substance is present in the urine only when progesterone is being formed in the body. The fact that menstruation happens regularly does not necessarily mean that ovulation has occurred; menstrual bleeding can certainly be present in the absence of ovulation. This absence of ovulation is diagnosed if endometrial biopsy shows the uterus to be in the proliferative phase just before the start of the menstrual flow, or if pregnanediol is absent from the urine throughout the cycle. Anovulatory cycles may account for a quite high proportion of sterility in normally menstruating women. Israel and Mazer[1] have reported that 33% of 109 such sterile women had anovulatory cycles. Other authors, however, do not place the proportion so high.

Treatment of these cases must obviously be based on administration of gonadotrophins, as animal experiments have clearly demonstrated that ovulation is controlled by such factors. It was first thought that extract of pregnancy urine (chorionic gonadotrophin) should be used for this purpose, because it was known to start ovulation in the rabbit. Experiments with such preparations in monkeys were, however, disappointing; if anything, the extract led to follicular degeneration and no luteinization occurred. Clinically the results with chorionic gonadotrophin were also disappointing, and in 1937 Hamblen and his associates[2] summed up their experiences of such treatment in eighty-five patients by saying: "The observed ovarian responses, judged either by direct inspection of ovaries, by microscopic study of these, or by inferential studies of the endometrium, do not warrant an assumption that ovulation and corpus luteum formation had resulted from such therapy." It was obvious that the ovaries of women and monkeys behaved in this respect very differently from those of lower species, and that the artificial production of ovulation in clinical cases was still to be achieved. In 1938, however, Davis and Koff[3] published a striking paper in which they claimed to have brought about ovulation in normal women by the intravenous injection of serum gonadotrophin (derived from pregnant mares' serum). Their series comprised thirty-six women patients at various stages of the menstrual cycle who were injected with 50 to 70 rat units of the gonadotrophin (which may be calculated to be approximately 400 to 560 international units): sixteen of the cases were found to have young corpora lutea when their ovaries were directly inspected during the course of operation performed sixteen to seventeen hours later. Although some of the women might have ovulated in any case, there were enough positive cases to back the authors' claim to be the first to demonstrate ovulation in women after injection of gonadotrophin. The results were confirmed by Siegler and Fein[4] in the next year; they gave 30 to 60 rat units intravenously and provoked ovulation in sixteen out of thirty cases. All these results had been obtained on normal women, and though Hall[5] claimed that twenty-four of forty-three sterile women became pregnant after treatment with serum gonadotrophin, later authors have not been able to repeat such numerous successes. Huber and Davis[6] report the production of ovulation and pregnancy in three cases of sterility with anovulatory menstrual cycles. They injected a small dose of 20 rat units intramuscularly on the ninth, tenth, and eleventh days of the cycle and a dose of 60 units intravenously on the twelfth day. They do not record the number of failures they have had, but state that they are "many." This gonadotrophin has also been used by these and other authors[7] for the treatment of amenorrhoea, metrorrhagia, and menorrhagia with varying degrees of success, though the evidence so far presented has not convinced the Council of Pharmacy of the American Medical Association that serum gonadotrophin should be accepted for inclusion in *New and Non-Official Remedies*.[8]

The reason for the differing degrees of success attained by the therapy may probably be explained by animal experiments. For instance, Rowlands and Williams[9] have compared the actions of pregnant mare serum in normal and hypophysectomized rats. They find that ovulation is readily caused in the intact animal, but they succeeded in making only one hypophysectomized rat ovulate in the same way. They explain the difference on two grounds: first, the ovary of the hypophysectomized rat is atrophic and therefore relatively unresponsive, and, secondly, the injected gonadotrophin, and/or the ovarian secretions which it provokes, cannot stimulate the test animal's pituitary gland, because it has been removed. Applying this to the clinical field, it is obvious that in many of the patients under treatment the ovary and/or the pituitary gland must be functioning subnormally, so that the serum gonadotrophin is not likely to act in so spectacular a fashion as in normal

[1] *Amer. J. Obstet. Gynec.*, 1938, **36**, 445.
[2] *Endocrinology*, 1937, **21**, 722.
[3] *Amer. J. Obstet. Gynec.*, 1938, **36**, 183.
[4] Ibid., 1939, **38**, 1021.
[5] *Calif. & West. med. J.*, 1939, **51**, 159.
[6] *Surg. Gynec. Obstet.*, 1940, **70**, 996.
[7] *South. med. J.*, 1940, **33**, 160; *Proc. roy. Soc. Med.*, 1941, **34**, 804; *South. med. J.*, 1941, **34**, 730.
[8] *J. Amer. med. Ass.*, 1940, **115**, 1998.

cases. Ovulation depends on the proper ripening of the follicle under the influence of follicle-stimulating gonadotrophin, and it is generally believed that it will not occur unless the proper amount of luteinizing hormone is present at the right time. Pregnant mare serum, though it does contain luteinizing activity, is predominantly follicle-stimulating. Huber and Davis try to ripen the follicles by their preliminary intramuscular injections and to attain the necessary concentration of luteinizing hormone by the subsequent intravenous injection; failure may be due to premature luteinization of the follicle, which does not then rupture. Monkey experiments have also shown that, while ovulation may be induced, the endocrine conditions are not always favourable to the implantation of the fertilized ova. For the rat, at all events, horse pituitary extract contains the two fractions in more physiological proportions, as it will provoke ovulation even after removal of the pituitary.[9] This does not, of course, mean that the pituitary extract should be more useful in women, but it does indicate the need for a large number of trials to be carried out, under carefully controlled conditions, with various doses and combinations of the different gonadotrophic extracts available; not forgetting in long-term administrations the possibility of antihormone formation. This has already been clearly demonstrated for serum gonadotrophin after as little as four to six weeks' treatment.[10] It is obvious at the moment that we are far from being able to lay down hard-and-fast rules for gonadotrophic therapy; but its usefulness has been demonstrated in selected cases, and we at least have a method of approach to the problem.

POLIOMYELITIS AND AIR-BORNE INFECTION

The importance of the alimentary tract rather than of the olfactory mucosa as the portal of entry for the virus of poliomyelitis in man has recently been stressed. Certain experiments now reported by Faber and Silverberg[11] have a strong bearing on this question. Rhesus and cynomolgus monkeys were placed in an atomizing chamber into which a suspension infected with poliomyelitis virus was pumped. The maximum amount of virus-infected fluid available to each monkey, based on an assumed even dispersion of droplet nuclei, ranged from 1.6 to 12.1 c.cm., a total of forty-eight rhesus and thirteen cynomolgus monkeys being used. Thirty-one rhesus and six cynomolgus monkeys were subjected to preliminary blockade of the olfactory mucosa with 1% zinc sulphate solution; the period of exposure to the spray varied from one to three hours. Of the thirty-two rhesus monkeys exposed for one hour only, none developed poliomyelitis, but of the remainder, exposed for 2 or 3 hours, ten developed poliomyelitis as shown by the presence of typical lesions and by subinoculation. Of these ten, four—two rhesus and two cynomolgus—had had previous nasal blockade. The rhesus monkeys with blockaded nasal mucosa developed weakness in the legs on the eighth and seventeenth days after exposure and no bulbar disturbances were seen. In the case of the cynomolgus monkeys the incubation periods were 11 and 14 days respectively: one of the cynomolgus monkeys had facial paralysis and some respiratory difficulty, and the other had severe respiratory involvement, probably of central origin, but no other form of paralysis. Now with normal rhesus monkeys, at all events, it is extremely difficult, if not impossible, to infect them by feeding with poliomyelitis virus; it therefore seems probable that in those animals whose nasal mucosa was blockaded by zinc sulphate the lower respiratory tract was the portal of entry, while in the cynomolgus monkeys the probable portal of entry was the tonsillo-pharyngeal area. These experiments therefore open up the possibility that human poliomyelitis may, at least sometimes, be an air-borne infection with the lungs as a portal of entry. The presence of virus in the human nasopharynx, repeatedly demonstrated, provides an obvious source of air contamination by patients and carriers. The relative importance during epidemic periods of transmission by air and by ingested material remains to be demonstrated.

[9] *J. Endocrinology*, 1941, **2**, 380.
[10] *Johns Hopk. Hosp. Bull.*, 1938, **63**, 351.
[11] *Science*, 1941, **94**, 566.

VITAMIN B_1 REQUIREMENT OF MAN

According to Cowgill's[1] theory that the amount of vitamin B_1 required by man depends on his weight and caloric intake, a man of 80 kilos weight receiving 3,000 calories a day would require 400 international units of vitamin B_1 daily. The Technical Commission of the League of Nations Health Organization declared the minimal requirement of an adult human being to be 300 I.U. per day. The optimal amount is probably double this. Williams and his co-workers[2] have put the minimal figures to test, and kept four young women for twenty-one weeks on a diet which supplied less than 0.1 mg. (33 I.U.) of vitamin B_1 per day. Supplements of riboflavin, nicotinic acid, ascorbic acid, and iron were given. The ratio of the number of I.U. of vitamin B_1 to the number of non-fat calories in the diet never exceeded 0.085, which is well below the ratio 0.25 which Williams and Spies claim to be the lowest for preventing vitamin B_1 deficiency. Symptoms developed much later than expected: they were anorexia, fatigue, loss of weight, insufficiency or complete absence of free gastric acid, constipation, and intermittent tenderness of the calf muscles. Four subcutaneous injections of 1 mg. vitamin B_1 each were given every three days. Subjective improvement was noticed a few hours after the first injection. Anorexia and fatigue disappeared and blood sugar became normal after a few days. The vitamin B_1 content of the urine had fallen to an average of 14 μg. a day during the period of deprivation, and during the whole of the subsequent twelve-day period of receiving the vitamin (4 mg. in all) the total excretion was 0.6 mg.

In a second study the same workers[3] made observations on six white women in a mental institution who received only 0.15 mg. vitamin B_1 daily for eighty-eight days. These patients developed a condition of neurasthenia and later symptoms of anorexia nervosa. There was no oedema, enlarged heart, or peripheral pain. When 0.95 mg. of vitamin B_1 was given improvement was noticed, but the general condition improved still more when 2 mg. daily was taken.

In a third study[4] eleven white women engaged in ward housekeeping, laundering, and sewing in a hospital were given 0.4–0.45 mg. (133–150 I.U.) vitamin B_1 a day in order to study the effect of a prolonged moderate deficiency of this factor. The diet consisted of white bread, cornflakes, potatoes, polished rice, sucrose, skimmed milk, beef, cheese, egg-white, butter, vegetable fat, cocoa, gelatin, canned fruits, canned vegetables, and coffee, the thiamine content of each item as well as the composite diet being determined by the thiochrome method of Hennessy and Cerecedo. Supplements of 20 g. autoclaved brewers' yeast, 0.1 g. halibut-

[1] *The Vitamin B Requirement of Man*. Yale University Press, New Haven, 1934.
[2] *Proc. Mayo Clin.*, 1939, **14**, 787.
[3] *Arch. intern. Med.*, 1940, **66**, 785.
[4] *Proc. Mayo Clin.*, 1941, **16**, 433.

liver oil with added viosterol (giving 5,000 I.U. vitamin A and 1,000 I.U. vitamin D), 80 mg. ascorbic acid, 0.2 g. exsiccated ferrous sulphate, and 0.6 g. tricalcium phosphate were also given. Disturbing symptoms occurred in one subject in 93 days, in three others in 132 days, in five others in 169 days, and in two others in 196 days. The thiamine content of the urine fell to 15–30 μg. within fifteen days of the beginning of the experiment. Capricious appetites with nausea and vomiting developed. No oedema or change in heart size was detected, but all subjects had faint cardiac sounds and low blood pressures; eight experienced giddiness when standing; cardiac rhythm was disturbed and anaemia was observed in five (3,000,000 to 3,500,000 erythrocytes per c.mm.). The anaemia was hyperchromic and macrocytic in type and, in three subjects, associated with achlorhydria. It was not relieved by giving additional amounts of iron, copper, riboflavin, nicotinic acid, pyridoxine, pantothenic acid, and choline. Loss of weight occurred in only one case. All subjects, however, after some weeks of deficiency became depressed, irritable, quarrelsome, fearful, and inefficient in their work. These symptoms disappeared later when they were given thiamine. One dose of 1 mg. was injected subcutaneously, then 3.0 mg. was given orally each day for seven days and thereafter 7.5 mg. daily. The oral doses were given in the food without the patients' knowledge. Complete relief of symptoms occurred only after several weeks.

From these observations and from other experiments with different doses of vitamin B_1 and their effect on urinary output of the vitamin, it was concluded that an intake of less than 0.5–0.6 mg. of thiamine per 1,000 calories of the diet leads to fatigue, irritability, poor appetite, insomnia, soreness of muscles, decreased activity, and a general feeling of ill-health. From 0.5 to 1.0 mg. of thiamine per 1,000 calories is probably the optimal amount for robust health—namely, from 500 to 1,000 units a day according to a person's total metabolism, which in turn depends on age, weight, exercise, etc., and also individual variation.

THE NATIONAL LOAF

Just over a year ago Lord Woolton stated in the House of Lords that he "could not insist on the public eating wholemeal bread," meaning thereby the 85% extraction flour now widely known as "National wheatmeal." Last week he announced that the consumer after April 6 will have to be content with wheatmeal bread and that white bread will no longer be available. Thus comes to an end a controversy that has lasted for 2½ years, and on which many hundreds of thousands of words have been spent in speech and print. As the public accepted the standard loaf in the last war without much ado, it has been difficult for anyone outside the Ministry of Food to understand why the liberty of the subject in respect of white bread has been looked on as such a precious thing. During the past three months, as the columns of the *Times* have shown, criticism of that Ministry's policy has become progressively acute, and Sir Ernest Graham-Little has attacked it in the House of Commons, this time to good effect. As Mr. W. Douglas-Brown, director of a firm of millers, has put it,[1] "the national wheatmeal loaf is a will-o'-the-wisp which will take practical shape whenever the public display a concerted predilection for it." This rather difficult manœuvre is now to be performed.

There has been a suspicion in more than one quarter that the interests of the millers have been allowed to stand in the way of the nation's health, and until this moment the Ministry of Food has shown signs of falling short of whole-hearted advocacy of its wheatmeal loaf. It has not shouted from the housetop that brown bread (or wheatmeal bread) is best—or even better. But we may well imagine that the difficulties to be overcome within the walls of the Ministry have been considerable. If, as many people hope, the Ministry of Food will continue after the war, it will, we trust, broadcast such a slogan far and wide, and so put a stop to the subtle rot in the public health started by the refining of foodstuffs. In time of war there is a good case to be made out for remedying deficiencies in the diet by adding such supplements as vitamin B_1 and calcium to, for example, flour. In peacetime, except in unusual circumstances, there would seem to be little to be said for such a policy, and indeed much to be said against it. All the evidence goes to show that the human alimentary tract, from the teeth to the colon, rebels against refined foodstuffs, and that in eating a quantity of refined foods people do indeed dig their graves with their teeth. It is a punishable offence to water milk and dilute the solids in it. Why, then, should it be thought praiseworthy to remove from the wheat berry the valuable minerals and vitamins it contains? The general public will probably never allow the medical profession to dictate to it what it should do in the interests of good health, and it will be a long time before the public is sufficiently instructed in such matters to receive advice without suspicion. Most "public health" measures are negative in their effect, restraining people from doing themselves positive and obvious harm. Until the day, then, when we can collectively have as much effect upon the public as have the vendors of patent medicines through the medium of advertising, we must follow Lord Horder's advice and "control the diet in voluntary and municipal hospitals, in convalescent and nurses' homes, and in many other institutions, and in some 40,000 private houses."

[1] *Times*, Feb. 27, 1942.

PAPER RESTRICTIONS AND THE "JOURNAL"

The course of the war since April, 1940, when Scandinavian sources of material for paper-making were cut off, has imposed progressive limitation upon supplies of paper, and this *Journal* in common with others has shrunk to small dimensions when judged by the standard of 1939. The shrinkage in number of pages was brought about gradually, and some readers may have been scarcely aware of it until last week's very slender issue came into their hands. The reason for this attenuation is as simple as it is disagreeable. Our paper ration has suffered another and a much more drastic cut and we must eke out the supply which the Paper Control now allows us by printing fewer pages each week, and in future issues by diminishing still further the size of type used in various parts of the *Journal* and *Supplement*. Since this is a professional organ of information and opinion, owned by the members and not run for profit, the advertisement pages have to fare far worse under the axe than the editorial pages. The British Medical Association, unlike the proprietors of all newspapers and of most periodicals, cannot compensate for dwindling paper supplies by materially cutting down circulation, because it is bound to send a copy of its *Journal* every week to each of the 40,000 members. Every effort will be made to economize space and to secure an adequate amount of paper, but readers and contributors must help us to make the best of a bad situation and be prepared for disappointments. The generous space given to correspondence will have to be curtailed, which means fewer and shorter letters. Everyone in these days is putting up with things he never thought to endure, and we look confidently to members of the B.M.A. to exercise forbearance. As for conciseness, it has become a major virtue in all who put pen to paper.

Correspondence

The Teaching of Anatomy

SIR,—Surely what Treves wrote nearly sixty years ago is as true to-day: "The student of human anatomy has often a nebulous notion that what he is learning will some time prove of service to him; and may be conscious also that the study is a valuable, if somewhat unexciting, mental exercise." It should, therefore, be the object of teachers to invest this study with the interest of its application to daily practice, and thus "make the dry bones live." Numerous old students of Prof. Thomas Yeates, many of them now surgeons, will recall with gratitude how this was done for them by his teaching. Osler reminds us that "to winnow the wheat from the chaff and to prepare it in an easily digestible shape for the stomachs of the first- and second-year students taxes the resources of the most capable teacher."

We may well inquire, therefore, what were the methods so successfully practised by Prof. Yeates (now, alas! retired, and I hope he will forgive my thus writing of him), who not only enlivened anatomy but made it fascinating. Much, of course, was due to his personality, but he constantly insisted on keeping the practical aspects of anatomy in front of his class. He refused to countenance those highly coloured drawings and diagrams so popular with some teachers, because, as he pointed out, anatomy is three- and not two-dimensional. Plasticine and the skeleton are therefore better than chalk and a lead pencil to reconstruct a mental picture of a dissection. His "talks round the body," as he called them, were so much more effective than any set lecture could be; the anatomical part under consideration was frequently and suddenly covered with a cloth, and the student as suddenly asked for the relation of, say, the nerve to the artery. The cloth was then removed to check the truth of his observation. Needless to say, this practice usually kept the student attentive, and, what is more, taught him practical anatomy which he remembered. Small classes taught on these lines would almost certainly produce better results than is often the case at present.

Another point I would make is the desirability of fostering a little romance in anatomy by retaining the names of the great high priests and telling students something of them and their work. If a student knows why Hunter's canal is so called, he will also know the principle of the Hunterian operation for popliteal aneurysm and will consequently remember that the femoral artery gives off its anastomotica magna (saphenous) branch in the canal. Call Hunter's canal the adductor canal and all this is lost.

Still another question which I believe needs consideration is the pace at which the student works. If he did anatomy in one instead of two years the pace might be more in proportion to the rest of the working speed throughout the curriculum: to spend leisurely two years quietly dissecting, smoking, and chatting whiles away the student's time pleasantly enough, but introduces a sluggish rate of working which throws the curriculum out of gear; and when he passes his second examination he finds that he needs to accelerate unduly if he is to hold the pace in the clinical years.—I am, etc.,

Cardiff. LAMBERT ROGERS.

Declining Population

SIR,—In the *Supplement* of January 24 (p. 13), and again in your correspondence columns of February 28 (p. 307), Sir Henry Brackenbury has quoted an estimate that the population of England and Wales will have declined by 3½ millions by the year 1965. In his letter he makes two remarkable statements. The first is that "on the facts of the decline of population there is no doubt." I know of no such "facts" and should like to be told what they are. The Registrar-General's quarterly returns show that the mid-year estimates of the population in 1935, 1936, 1937, 1938, and 1939 were 40.6, 40.8, 41.0, 41.2, and 41.5 millions respectively, and since then no estimates of the total population have been published.

The second statement, that the estimate of future decline which he quotes "is the most conservative of the careful calculations that have been made with regard to this decline," is not correct. In the evidence given in 1938 by the Registrars-General of England and Wales and Scotland to the Royal Commission on the Distribution of the Industrial Population the following estimates, based upon what they then considered to be the most reasonable forecasts of the future trends of birth and death rates, were given for the populations of Great Britain in census years: 47.19 millions in 1961 and 45.98 millions in 1971 (see report of the Commission, p. 141). The estimate for 1965 would be about 46.7 millions, or about half a million more than in 1938. This was based upon the assumptions that fertility would remain at the level of 1934-7, that death rates would continue to decline at each age as in recent decades, and that the inward balance of migration would cease from 1941-51 onwards. Dr. Enid Charles also estimated that if fertility was restored to the 1931 level and death rates continued to improve, the population of Great Britain would increase to 48.7 millions by 1965, a rise of 2½ millions over 1938. On other, less favourable, assumptions she arrived at much lower totals.

No one can predict what the total effects of the war will be on deaths or births, but it can be said that up to the date of writing the excess of deaths from causes other than direct enemy action has been no more than was to be expected from the unusual coldness of the winters through which we have passed, and climatic vagaries have a way of neutralizing themselves over a couple of decades. With regard to the birth rate the Registrar-General's report on the Fertility of Women in 1938 (Statistical Review, Part II), shortly to be issued, will show that the adjusted reproduction rate, which allows for a continuing improvement in the death rates of women, was 0.84 in 1938, and in order to ensure that no substantial decline in total population occurs as a result of low fertility, it will need to be raised to unity, either by more or earlier marriage or by greater fertility within marriage, or by both. The war has, for the time being, reduced the reproduction rate—though the birth rate is not yet appreciably below the minimum reached during the industrial depression in 1933—but it has also increased the population of young married women to such an unexpected degree as to make possible a very substantial rise in the reproduction rate among women as a whole when the war ceases.

May I urge that we avoid creating the impression that a great fall in population is now inevitable and that nothing can be done to prevent it. Such an erroneous view can only do harm by adding more discouragement to that lamentable sense of national inferiority from which a large section of the population now seems to be suffering. The next stage, I suppose, will be to question whether it is worth while to try to maintain our population; and if we allow idealism to sink to that level maybe the question will be justified. One thing does seem inevitable—namely, that our future population will contain a much larger proportion of elderly people than now; and all planning for the future should take account of that. But, taking all known factors up to the present into consideration, a large fall in our total population is not inevitable unless our future war losses are catastrophic or the war is greatly prolonged, and by wise encouragement, in which the medical profession can play an important part, aided by legislative action it may yet be averted.—I am, etc.,

General Register Office, Statistical Branch. PERCY STOCKS.

Delay in the Union of Fractures

SIR,—The recent correspondence about delayed union in fractures has not mentioned two factors which may have some bearing on the question.

The first is the change in velocity of the forces producing the fracture. This change has undoubtedly altered the incidence of certain types of bone and joint injury; may it not also have altered the actual bone defect at the site of fracture? For instance, the high velocity of the modern vehicle on impact produces fracture rather than dislocation, and, except for the "dash-board dislocation," dislocation of the hip is uncommon compared with even fifteen to twenty years ago. Surgeons dealing with compound fractures cannot fail to notice at operation the varying effects on the bone of injuries caused by different velocities of force. To take a gross example: compare the splintering destruction of a rifle bullet of relatively low velocity and the "granulated sugar" disintegration of bone caused by the high velocities (longitudinal and rotatory) of the fragment

of bomb casing. Surely there must be less marked, but nevertheless distinct, changes in the closed fractures produced by varying degrees of velocity of impact.

The delay in union of fractures noted by clinical observers may be due to this change in the method of causation. This theory appears to be borne out by the opinion of those who incriminate skeletal traction, because, taken generally, it is the high-velocity type of fracture that requires this form of reduction. I have noticed the tendency to slower union in certain fractures, and only on thinking it over have realized that most of these cases have been caused by high-velocity injury. There appears to be more delay in fractures of the tibia and fibula (caused usually by motor vehicles these days) than, for instance, in Colles's fractures, still produced by the old and low-velocity method.

The second factor is diet, dismissed summarily by most of your correspondents. On this I hesitate to pass an opinion, but in the *Annals of Surgery*, 1940, **112**, No. 4, 481 and 576, Whipple of New York and Radvin of Philadelphia stress the importance of an adequate supply in the diet of protein and vitamin C for normal wound healing; they have proved experimentally a "lag period" in healing when these substances are deficient. It is interesting that under present conditions these two constituents are little more than a bare sufficiency for health.

In several letters skeletal traction and unpadded plasters have been blamed for delay in union; I trust this letter may help to exonerate these useful methods of proven value in the treatment of fractures.—I am, etc.,

Evesham. G. HARVIE DUNCAN.

Research on Anaesthetics

SIR,—The statement in the annotation on new anaesthetics (Feb. 28, p. 300) "that in this country no work whatever has been done towards the introduction of new anaesthetics, either volatile or other," is not strictly accurate. Twenty years ago, impressed by the mortality attributed to the administration of anaesthetics, which seemed to me relatively greater than in the days of my youth, when open chloroform and closed ether were alone used, I commenced an attempt to discover an inhalation anaesthetic which would be almost foolproof in its administration and afford a non-inflammable mixture. The principles involved in the choice of such an anaesthetic were obvious, and Beilstein's *Handbuch der Organischen Chemie* was combed for likely substances. A formidable list was made, which was reduced to some gases and volatile liquids, chiefly chloro-derivatives and mixed ethers, for preliminary investigation. The list included all the inhalation anaesthetics introduced in recent years. The research was also designed to determine effects in the early action of anaesthetics not sufficiently known, and some of the results obtained were described in a series of nine papers by my assistant, Dr. B. M. Davidson, in the *Journal of Pharmacology and Experimental Therapeutics* about 1925. Dr. T. J. C. Macdonald investigated the action of some chloro-derivatives and ethers on the isolated heart, but his results, I believe, have not been published.

A result of the investigation in so far as it was carried out was to impress me with the possibilities of propylene as an anaesthetic. A consequence of anaesthesia is tissue anoxaemia, and a point kept in mind was a mixture which would contain a superabundance of oxygen. A combination of 24% propylene with 33% oxygen produced in me complete anaesthesia in 3 minutes and was without ill effects. Later I heard that propylene had been tried as an anaesthetic, I believe in Scandinavia, and had produced some undesirable actions. I wondered if the gas had been obtained pure. The next substance of this class investigated—namely, isobutylene—did produce an unexpected result, which I attributed to not having purified the gas with sufficient care. I felt that it was not quite right when commencing the inhalation, and after the inhalation ceased recovery was greatly delayed: indeed, I had to be removed to my home in an ambulance. Owing partly to this mishap and partly to the preparation of some of the chosen substances being beyond the resources of the department the research was discontinued. Some facts of interest had been obtained which perhaps should have been recorded, but it was felt that further work was necessary to make the investigation of real value to the practice of anaesthesia.

To retrieve British pharmacology from the imputation in the quotation given that it has not thought on these things, I should like to add a word on local anaesthetics. At the beginning of the last war there was a demand for novocain that could not be satisfied. If I remember rightly, glycol was the difficulty. It occurred to me that a similar product with two effective groupings instead of one could be made from glycerin. At least the half-way house along the difficult way towards the goal of making this substance was reached when the glycol difficulty was solved. The war brought other work, and this substance has not yet been prepared. Theoretically it seems as though it might prove a not unworthy member of the large class of local anaesthetics.—I am, etc.,

Burley-in-Wharfedale. C. R. MARSHALL.

War Neuroses

SIR,—I was much interested in Major Hadfield's statement that "of various types of anxiety seen after a bombardment or a 'blitz,' some of which are true neuroses, many are simple states of fear or anxiety that pass away with the passing of the stimulus of danger. The fact that these patients are predisposed to anxiety does not mean that they are neurotic: they are simply frightened." Nevertheless in his statistical abstract Major Hadfield has not differentiated these cases, having been obliged to conform to the "very inadequate" *Nomenclature of Diseases* of the Royal College of Physicians.

I described this group of cases in an article in the *Journal* for June 14, 1941 (p. 885), and urged then that it should be separated from the neuroses, suggesting the term "hyperphobesis" for the condition, for which at present there is no name. In a recent series of 253 cases discharged from the Forces for all types of nervous disorder, which I examined for the Ministry of Pensions, 86 belonged to this group; and of 200 civilians 42 were so classified. These sets of figures are not strictly comparable, since the civilians were seen much nearer the event which caused the disturbance and consequently contained a higher proportion of cases of concussion. It is obvious that until these fear-conditioned cases are separated we shall have no true picture of their incidence or of that of the psychoneuroses. I would again strongly urge that the present system of classification be revised so as to show these cases separately.—I am, etc.,

London, S.W. WILLIAM A. BREND.

War Neurosis: The "Awareness" of Fear

SIR,—To Dr. J. A. Hadfield's list of possible causes of the rise in the ratio of anxiety states to conversion hysterias in this war as compared with the last (Feb. 28, p. 281), may there not be added the altered judgment which normal men pass upon their emotions after twenty years' permeation of knowledge about psychological repression? Modern young men surely hold fear to be less reprehensible in others than did their fathers, and they are much more ready to admit to it in themselves. Who does not now shudder at the thought of the death penalty for "cowardice in the face of the enemy"? The man whose introspection readily appraises his own fears and, though he may combat them, is not deeply ashamed of them, will readily suffer from anxiety states, but he lacks the requisite mechanism for a conversion hysteria—namely, *unawareness* of his cowardice.—I am, etc.,

Parkstone. RANYARD WEST.

National Economy of Fats, Oils, and Paper

SIR,—Having perused a copy of the *National War Formulary*, 1941, I notice that under the heading "Oils and Fats" on page 6 it states: "Economy is essential. Liniments, lotions, and ointments use considerable quantities of animal or vegetable oils and fats which are needed for food and other purposes." With this sound, sane, and sensible advice nobody will disagree, but as a dermatologist one knows that one of the best methods of making these oils and fats go very much further than any of the antiquated ointments mentioned in this *Formulary* is to utilize one of the emulsifying bases, and convert the oil or fat into a water-miscible emulsifying cream or lotion, as required, in which can be incorporated any active medicament necessary.

The use of emulsifying agents in dermatology was first advocated by me at the Section of Dermatology of the British Medical Association Meeting in Belfast in July, 1937 (Aug. 7, 1937, p. 288), and has since been advocated by many other dermatologists, notably by Dr. P. B. Mumford of Manchester. After nearly six years' practical experience with them I can state that they are a distinct advance from a therapeutic point of view, and the saving of fats and oils is immense, as their use requires only 15% or less of these latter, now very valuable, ingredients, as against the 100% in the usual *B.P.* ointment bases. Also preparations so made are more elegant, which is a definite cosmetic point, and are water-soluble and therefore can be removed, mostly with water alone, or, at the most, with a minimum of soap and water, from soiled clothing, etc., which is again a further saving of fats and oils.

I had hoped to see the use of emulsifying agents officially sanctioned by their inclusion in the *British Pharmacopoeia*, but as changes in the official therapeutical mind are usually very slow in germinating, I had at least hoped that the exigencies of the present time would have compelled some fresh line of active cerebration in those responsible for the *National War Formulary*, resulting in some gain to our domestic menu by saving fats and oils and in no loss to our antiquated menu of *B.P.* ointments, etc. Surely it is time to have a few new, even if unofficial, lines of thought. There is an enormous field of utility for emulsifying agents, in both medicine and commerce of all kinds, but the latter has not been slow to see this, as emulsifying agents are used in nearly all branches of trade for some purpose or other, while the former just "carries on" obliviously.

With reference to national economy of paper, I would like to suggest that as in some districts two or more doctors are in partnership then the current issue of the *British Medical Journal* could be sent to one of the partners only, or to the "firm" as such, and be shared among them all as desired, so saving sending duplicate copies to all the other members. This would, of course, be a wartime measure and would be voluntary, only those members of the B.M.A. who signify their willingness to acquiesce doing so. Should there be any financial gain to the B.M.A. as a result, then it could be put to some wartime or similar good work. To show what I mean, I will be willing to forgo my weekly copy of the *Journal* and share that of my partner instead.—I am, etc.,

Leicester. F. A. E. SILCOCK.

Compression Injuries at Sea

SIR,—The following two cases belong to one of the groups described by Breden, d'Abreu, and King in the *Journal* of January 31 (p. 144). Both belong to the same group as these authors' Case 1, but as both men died at sea they did not reach the hands of the R.A.M.C. They were both in the water when depth charges from their ship, which had been torpedoed, exploded under water.

Case 1.—When picked up was able to climb up the side of a corvette. When seen about two hours later his upper chest, the neck, and the face up to the eyes was one enormous area of emphysema. He was then completely collapsed and he died within half an hour.

Case 2.—Was also very collapsed when first seen. He was vomiting blood-stained fluid, and his abdomen was painful, rigid, and tender, chiefly in the lower half. He also had considerable testicular pain. Four to six hours later his general condition had improved considerably, but his abdomen was *in statu quo* and he had passed blood per rectum. At this time he appeared to be a definite case of ruptured abdominal viscus requiring immediate operation, but unfortunately he was in a ship with no surgical facilities whatever and half a gale was blowing outside. Signs of spreading peritonitis soon developed and he died about thirty-six hours after being picked up.

The first case indicates that under some conditions compression waves in water can cause extensive lung injury. The second shows that there are some cases which require immediate operation. I must admit that one of the cases in Group A of Breden, d'Abreu, and King also appeared to be one for immediate laparotomy about four hours after being picked up, but while he rapidly improved Case 2 equally rapidly deteriorated.—I am, etc.,

J. C. MACINTOSH, M.B., Ch.B.,
Surgeon Lieutenant, R.N.V.R.

Tuberculosis Sanatorium Accommodation

SIR,—From the recent correspondence in your columns it is clear that many eminent authorities would regard the case of active pulmonary tuberculosis as a menace to the community and notably to young children (vide Dr. C. N. C. Toussaint, February 28, p. 303). It would seem prudent, therefore, even for the protagonists of the endogenous aetiology, to ensure, so far as possible, the prompt segregation of such cases. Further, all authorities would agree that the earlier adequate treatment is instituted the better will be the patient's chances of a speedy and permanent cure.

It is therefore disquieting to realize the shortage of accommodation at present prevailing in appropriate institutions. A delay in admission for, it may be, as long as three months is surely a serious matter. Viewing the rows of vacant beds elsewhere, one is driven to reflect upon the relative good fortune of the potential, as contrasted with the existing, casualty.—I am, etc.,

London, W.1. T. TWISTINGTON HIGGINS.

Treatment of Meningococcal Meningitis

SIR,—I have read with interest the recent articles on the treatment of meningococcal meningitis. My own experience of such cases is limited to twenty, in which figure there has been one death, this being in a young adult, admitted in deep coma, who died shortly after admission. In common with all series of cases the results of the use of sulphapyridine have been remarkable, but I should like to draw attention to some minor points of difference.

1. The dosage of sulphapyridine: The largest dose which I have found it necessary to use in adults has been 27½ grammes (by all routes), and the smallest 19 grammes. The average dosage has been 24-25 grammes. This figure seems to be considerably lower than that in common use, but the results indicate its effectivity.

2. I still place high value upon repeated lumbar puncture. The alleviation of restlessness and confusion is marked after this. Whilst agreeing that repetition of this minor procedure is not usually necessary, I would say that it is desirable on these grounds. In one other class of patient repeated lumbar puncture has been used with success, and that is the baby with what was formerly termed "posterior basic meningitis"—namely, a meningococcal meningitis with marked head retraction. This has meant the daily administration of a general anaesthetic in the case of a baby of 6 months, owing to the approximation of the head and buttocks in opisthotonos, but with eventual complete recovery.—I am, etc.,

Stretton, Nr. Warrington. JOHN W. CROWTHER.

Breech Delivery

SIR,—I should like to answer some of the questions raised by Major D. C. Racker in his letter (Feb. 21, p. 273) regarding my paper on breech delivery. First let me say that, in primiparae, I always make a wide episiotomy as the breech distends the vulva, and I believe that it is unsafe to attempt delivery with the perineum intact. This procedure is not commonly adopted by medical practitioners, and of course midwives are not expected to require an episiotomy in conducting a breech delivery. In speaking of the stretched and torn perineum I had in mind certain cases in which no episiotomy was made, for which I was summoned later to repair the damage.

With regard to low impaction of the breech, this will sometimes occur in spite of episiotomy, and then a leg must be brought down without too long delay. Whether anything more should be done must remain a matter of opinion, and the remark that immediate extraction was my own practice was intended to suggest, by inference, that this procedure might not be acceptable to everyone. At the same time, under the conditions present I have found extraction easy. The vagina has been well stretched, the cervix will be effaced, and the operation is very different from "extraction" after version or with the breech high in the pelvis. The alternative course means allowing the patient to recover from the effects of the anaesthetic, and then she must continue her bearing-down efforts, which has always seemed to me a lot to ask. I have found the immediate delivery satisfactory, and therefore cannot say that I have experience of the latter method.

Finally I should like to express my indebtedness to Major Racker for pointing out these ambiguous passages, and I am very pleased to find that in so many respects we agree upon the proper management of these cases.—I am, etc.,

Woking. L. G. HIGGINS.

Derris Powder in the Treatment of Scabies

SIR,—Last spring I found that this fine white powder was much more effective in the destruction of the green cabbage fly than the solution; also that it was not poisonous, was free from smell, and had no ill effect on human skin or clothing. Two ounces of the powder was prescribed and the patients were advised to put it into an empty talcum-powder tin. They were told to scrub themselves and their near contacts with soft soap and water on three successive nights. This was to be followed on each occasion by the free dusting of their bodies, underclothes, and bedclothes. Lotio calaminae, with liquor picis carbonis ɱx to ʒj, was given to soothe the irritation and to assist the powder to adhere to the areas which most required attention.

The advantages of this treatment are: (1) It does not soil the underwear or bedclothes, and this saves time and soap. (2) It does not irritate the skin nor does it smell like sulphur. (3) A small container with a perforated end can easily be carried with a suitable lid. Should any escape no harm will be done to food or clothing; this has already proved useful to members of the Forces. (4) It is very cheap.—I am, etc.,

Leeds. L. C. LODGE.

Phenothiazine for Threadworms

SIR,—In an annotation in the *Journal* of February 7 (p. 191) devoted to the treatment of threadworm infestation with phenothiazine you refer to the work of F. De Eds, C. W. Eddy, and J. O. Thomas, and say that "the impression conveyed is that phenothiazine is largely if not wholly absorbed." You then go on to say: "Presumably some must remain in the bowel, but on this point there is no precise information in any of the studies."

In 1939, when I was resident medical officer at the Albert Dock Hospital, under the direction of my former chief, Sir Philip Manson-Bahr, I treated a number of lascars who were suffering from mixed worm infections with phenothiazine. The object at the time was to discover what effect the drug would have on hookworms. As Sir Philip has already reported (*Lancet*, 1940, **2**, 808) it proved ineffective for hookworms, but very effective for threadworms. It also proved to be extremely lethal to roundworms (*Ascaris lumbricoides*), and in the case of one lascar eighteen dead worms were passed in a single motion. In all cases the roundworms were stained bright red, the colour being identical with that of the urine of the patients while under treatment with phenothiazine. Section of the worms showed uniform red staining throughout the tissues. Obviously ingestion of the drug by the worms had occurred, thus demonstrating the presence of the drug in the bowel.—I am, etc.,

B. FREEDMAN,
Capt., R.A.M.C.

Unification of Casualty Services

SIR,—In the event of invasion, casualties would occur among the Home Guard, Civil Defence workers, women, children, and old men alike. To deal with these casualties there are the A.R.P. Casualty Services and the Home Guard Casualty Service, which has only recently come into being in an official form, and unattached general practitioners. The two services are interwoven and would have to work together in an emergency, yet in many places they are under separate authority and different medical officers. This must tend to cause either overlapping or gaps and a lack of co-ordination.

Within the casualty services there are two organizations performing the same task—the Red Cross and the St. John Ambulance Brigade. There is often a good deal of jealousy and ill feeling between these two, and this not only exists among the members of detachments in the same locality but is sometimes apparent even among those holding responsible positions. It seems absurd that there should not be at all events a common textbook and common lectures and examinations. Would it not be possible for a Home Casualty Service to be formed under one control to deal with all home casualties, whether caused by invasion or air raids, and whether to the Home Guard or civilians, and would it not be possible for both the Red Cross and the St. John Ambulance Brigade to become a joint organization in fact as well as in name, and merged into one, at all events until peace comes? I do not know how all this affects urban districts. I am referring only to rural districts of which I have a knowledge.—I am, etc.,

Stokenchurch. E. L. ELLIOTT.

The Services

Lieut. D. A. Bird, R.A.M.C., who was killed in France in 1940, has been mentioned in dispatches in recognition of distinguished services in France and Flanders.

CASUALTIES IN THE MEDICAL SERVICES

ROYAL NAVY

Temp. Surg. Lieut. ERIC ANTONY SPOUSE, M.B.E., R.N.V.R. (H.M.S. *Matabele*), is reported "Missing, Presumed Killed" in an Admiralty Casualty List published on March 9. He qualified L.M.S.S.A. in 1939, and, after holding the post of house-surgeon at the Kent and Sussex Hospital, Tunbridge Wells, entered the R.N.V.R. He was awarded the M.B.E. (Military Division) in this year's New Year Honours. His home was at Hastings.

Prob. Temp. Surg. Lieut. BASIL RICHARD BRAY, R.N.V.R. (H.M.S. *Greyhound*), who is posted as "Missing, Presumed Killed" in an Admiralty Casualty List published on March 7, was educated at the Universities of Sheffield and Cambridge. He qualified M.R.C.S., L.R.C.P. in 1938, and took the M.B., B.Chir. degrees in the following year. He held the post of assistant casualty officer at Sheffield Royal Infirmary before entering the R.N.V.R. in 1940.

Missing.—Temp. Surg. Lieut. H. T. L. Broadway, R.N.V.R.

ROYAL ARMY MEDICAL CORPS

Lieut.-Col. ALEXANDER GILLILAN JOHNSON MACILWAINE, C.I.E., R.A.M.C., died in London on March 3, aged 55. He was educated at Queen's University, Belfast, and later at the London and Middlesex Hospitals, taking the L.R.C.P.&S.I. in 1911. In 1910 he gained the gold medal for practical midwifery at Belfast Maternity Hospital. After serving as resident clinical assistant at the Royal Victoria Hospital, Belfast, he entered the R.A.M.C. for service in the war of 1914-18, rising to be brevet major. In 1915-17 he served as D.A.D.M.S. in charge of embarkation work at Bombay, and from 1917 to 1920 in Iraq, when he was mentioned in dispatches and thanked for his services by the Mesopotamia Sanitary Commission. He also received the C.I.E., and was Honorary Surgeon to the Viceroy of India from 1915 to 1920. After the war he was in practice in London, but rejoined for service in the present war with the rank of lieut.-col. He was an Officer of the Order of St. John of Jerusalem and a member of the British Medical Association.

Lieut. FREDERICK SCHULZ is included as "Died" in an Army Council Casualty List published on March 9. He was educated at the University of Prague, where he graduated M.D. in 1936, and last year he was admitted to temporary registration in the United Kingdom for the duration of the war. He held a post at the North Suffolk and Lowestoft Hospital before entering the R.A.M.C. as temp. lieut. in December last.

Temp. Lieut. GEORGE DUNCAN RALPH BLACK, O.B.E., V.D., who is reported to have been killed in Hong Kong in Dec., 1941, was educated at the University of Toronto, where he graduated M.B., C.M. in 1905. For many years he was resident in Hong Kong, and had been a member of the B.M.A. since 1908. He served as president of the Hong Kong and China Branch of the Association in 1934-6, and as representative of the Branch at three Annual Representative Meetings. He had been principal medical officer of the Hong Kong Volunteer Defence Corps, in which he had attained the rank of lieut.-col., and was awarded the O.B.E. (Military Division) in 1935 for his services in connexion with the corps. He received a commission in the R.A.M.C. at the close of last year.

Wounded.—Temp. Major C. H. George.

INDIAN MEDICAL SERVICE

Lieut.-Col. KANSHI RAM BATRA, who is recorded as "Died" in an India Office Casualty List published on March 5, was born on August 10, 1890, and was educated at University College, London, qualifying M.R.C.S., L.R.C.P. in 1915. He immediately entered the I.M.S. as lieut., being one of the successful candidates at the last competitive examination for commissions in the I.M.S. which was held, and was promoted capt. in 1918, major in 1926, and lieut.-col. in 1934.

Obituary

SIR HENRY BRACKENBURY, M.D., LL.D.

Former Chairman of Council, B.M.A.

The announcement of Sir Henry Brackenbury's sudden death on March 8 at his home in the West of England has caused deep and widespread regret.

It is not easy to present such a career without allowing the narrative to become a mere catalogue of offices and dates. His work for the British Medical Association, done as much of it was while carrying on a large suburban practice, would have more than absorbed the energies of most men, but he found time to plough other fields of public service, and he was almost as well known in the world of general education as in that of medical politics. He had not one career, but several, and achieved distinction in them all. When he came to high position in the central Council of the B.M.A. he had already been mayor of a large borough on the border of London, also president of the National Association of Education Committees, with experience of the governing bodies of several large secondary schools and membership of departmental committees of the Board of Education, and in the B.M.A. itself he had been chairman of his Division and president of his Branch. How he ever threaded his way through the multitude of committees which claimed his services must remain a mystery. In one year (1934), in the B.M.A. alone, he served on 26 committees and sub-committees, and even in 1938, when he had relinquished a certain amount of Association work, he was still a member of 14. Nor was he ever a silent or perfunctory member. His interventions really shortened the proceedings, because when he had spoken most people felt that there was nothing more to say, and he would bring the question at issue to final decision or shape the recommendation as the case might be.

Henry Britten Brackenbury was a clergyman's son, which may account for the deep seriousness which marked his character and speech. He was born in 1866, and educated at Kingswood School, Bath, a school founded by John Wesley, principally for the sons of Methodist ministers. There he obtained a scholarship which would have carried him to Oxford had private circumstances allowed. He entered Westminster Hospital Medical School, and qualified in 1887. After holding hospital appointments in London he started in general practice in Hornsey, a growing suburb. Soon he began to take an interest in local affairs. Education claimed him from the first, and in 1898 he was elected at the top of the poll to the school board. Five years later the functions of the board were transferred to the Urban District Council, of which he became a member, and at the incorporation of Hornsey he remained as one of the councillors and later, for many years, an alderman. In 1905, when not yet forty, he was elected mayor. His interest in municipal affairs was chiefly in education and in public health, and thanks largely to Brackenbury's work Hornsey was soon in the van of educational progress. He was chairman of its Education Committee for ten years, and was co-opted on to the county (Middlesex) education authority, where he served for thirty years. He drew up the first syllabus of lessons in personal and domestic hygiene ever adopted by an education authority for use in public elementary schools and the first set of by-laws regulating the employment of school children.

At Hornsey, therefore, which in 1930 admitted him to its freedom, he graduated in public life. The abilities which so quickly shone forth in the local council chamber soon found wider opportunities, but it was in dealing with municipal affairs that he became accustomed to the routine of committee work and acquired the technique of public debate. No doubt his persuasive logic, his ability to marshal facts and arguments, was an innate gift, but it was all the better for having been practised first in this local field.

WORK FOR THE BRITISH MEDICAL ASSOCIATION

Brackenbury's membership of our Association dated from 1907, a few years in advance of that testing time when the profession seemed likely to be rent in twain by the convulsions attending the passing of the National Health Insurance Act. He described more than once how, like many others, he had felt impelled to quit the Association. He actually wrote a letter of resignation, but turned back at the pillar-box. Instead of resigning he went to work on behalf of the Association. In his own Division he urged the importance of the revolution that was foreshadowed by this legislation. He entered into the local administration of the new Act, and was for many years a member of both the London and the Middlesex Local Medical and Panel Committees and of the Middlesex Insurance Committee.

In 1914 he became a member of the Council of the B.M.A. Here as elsewhere his obvious abilities marked him out for leadership. Within two years he was chairman of the Insurance Acts Committee. To him it fell to take the lead in building up the fine organization of insurance practitioners, autonomous and yet within the ambit of the Association, through which the views of the whole profession can be expressed. The Insurance Acts Committee is still a body of great importance, but its work runs now on smooth rails. In those earlier days the railway had to be cut. Indeed, the land over which the railway was to run had to be acquired. Situations had to be dealt with for which there was no precedent, and great responsibilities had to be undertaken. It was no light task, and was not made easier by vociferous critics. Brackenbury once compared some of them to Mr. Flosky in Thomas Love Peacock's *Nightmare Abbey*, who, "because not everything had been done, deduced that nothing was done, and from this deduction, according to his system of logic, he drew the conclusion that worse than nothing was done."

In the task of remodelling the terms of service of insurance practitioners to meet the conditions arising after the end of the last war, Brackenbury's leadership was of immense value. His conduct of the negotiations of 1923-4, when a drastic reduction in the capitation fee was threatened, and his presentation of the doctors' case at the Court of Inquiry were, by general consent, masterly. The feelings of insurance practitioners towards him were marked by a widely subscribed testimonial which took the form of a cheque for £6,500, a gold watch, and a canteen of silver plate. In the same year he received the Gold Medal of the Association for "arduous and distinguished services to the Association and the profession."

In 1924 he resigned the chairmanship of the Insurance Acts Committee and was elected Chairman of the Representative Body. To a man with a gift for debate the chairmanship of a deliberative assembly is not the happiest position, but during this period the new House of the Association was opened, and on this and other occasions the Chairman of the Representative Body was called upon for a good deal of what might be described as decorative speech making, and Brackenbury shone in this role also. He could make a graceful speech, with just the right turn of phrase and the apt allusion, thanks to his wide reading in some unaccustomed paths of literature.

CHAIRMAN OF COUNCIL

At the Edinburgh Meeting of 1927 Brackenbury was elected Chairman of Council of the Association, a position he held for seven years, laying it down at Bournemouth in 1934. During that period the energy and wisdom he brought to Association affairs can be appreciated only by those who were in almost daily contact with him. They were important years in the history of the Association, covering its Centenary, and years also when the opinion of the Association was increasingly sought by Government Departments and public bodies—years when policy was gradually being framed. The B.M.A. memorandums are mostly anonymous, but it is not difficult to

detect in many of them issued at this period the hand of the Chairman. His instant grasp of the many subjects presented, his rapid analysis of the points, combined with his natural gift of leadership and unusual capacity for work, were of inestimable value to the Association. During his chairmanship he received a knighthood. He was also made Hon. LL.D. Wales at the Cardiff Meeting in 1928, and Hon. M.D. National University of Ireland at Dublin in 1933.

The outstanding work done by Brackenbury in many fields can be gleaned from successive Annual Reports of Council and the proceedings of the Representative Body. He had a mind for detail, and yet was never so engrossed in it as to forget the wider view. Although himself a general practitioner and an ardent advocate of the freedom of general practice, the public health medical service had no greater friend. He stood for general practitioners first and foremost, but he did not stand for them as a segregated body: he wanted the profession —whether general practitioners, consultants, or medical officers of health—to be considered as one. In hospital problems he carried the same statesmanlike point of view, well illustrated in the report of the Voluntary Hospitals Commission in 1937, with which he had a good deal to do. Medical education also interested him, and here some opportunity was given him as a member of the General Medical Council, to which he was first elected as a direct representative in 1924, heading the poll with 11,500 votes. One of his notable pieces of work was to travel, when over seventy, to the Antipodes at the request of the profession in New Zealand, where a national health insurance service was on the point of introduction. It is enough to quote the testimony of the honorary general secretary of the New Zealand Branch that the visit was most opportune and his help and counsel of tremendous value. "His intimate knowledge of administrative procedure and his familiarity with the methods of debate have added great weight to the representations made by the Branch to the members of the Government."

An interest which derived from both his educational and his medical activities, but which owed not a little to his compassionate nature, was his work on behalf of the feeble-minded. He was chairman of managers of a special school for mentally defective children and for a number of years chairman of council of a home for feeble-minded mothers and their babies. He was also closely interested in the Association of Mental Welfare, and was chairman of council for many years of the Tavistock Clinic, also known as the Institute of Medical Psychology.

It is a strange reflection upon our methods of choosing legislators that a man so well fitted for Parliament never got there. He made two attempts, one at East Walthamstow, as an Independent Liberal, in 1922, and the other as candidate for the Combined English Universities, when he stood as an Independent in 1937. Perhaps the trouble was that he was not a Party man, nor did he court popularity. He was a master of compromise in the sense of reconciling opposing points of view so as to achieve some practical result, but he would have nothing to do with that form of compromise which meant the sacrifice of personal convictions. He never trimmed his own views to make them agree with those of others. The first impression one had of him was of an austere personality, though he mellowed greatly in later years. But those who knew him found that he had a keen appreciation of humour (though he rarely used it in his speeches) and a great kindliness and charity, a willingness to recognize and praise work well done, and a toleration of genuine mistake. Against him least of all could the reproach be levelled that he stood in the limelight while others did the work in the background. Like many men who are skilful in debate, he did not employ his pen in any considerable authorship, though he was for years a valued anonymous contributor to these columns. A little book by him entitled *Patient and Doctor*, containing some interesting and stimulating chapters on the organization of the medical profession, the training of the doctor, and the present outlook in medicine, was published in 1935. He also contributed an article on social insurance to the *Encyclopaedia Britannica*.

Lady Brackenbury, whom he married in 1898, and to whose help he often gratefully referred, survives him with one son and one daughter.

The death occurred on February 24 of Dr. JAMES GAIRDNER, the Medical Officer of Crieff, at the age of 96. So comes to an end the wide country practice carried on by himself and his father for the long period of 103 years; and there goes to his rest one who claimed to be the oldest M.O.H. in Britain and possibly in the world. Dr. "Jamie," as he was known to all in the neighbourhood, was born in Crieff (his father, Dr. Matthew Baillie Gairdner, a native of Glasgow, set up in practice in Crieff in 1839), was one of the original pupils to enter the newly opened secondary school, Morrison's Academy, in 1860, and was dux medallist of the school at the age of 15. He went to the University of Edinburgh, where he graduated M.B., C.M. at the age of 21, and took his M.D. degree in 1873. Entering into partnership with his father, Dr. Gairdner was at a special meeting of the Crieff Parochial Board seventy-five years ago appointed Medical Officer for the Parish of Crieff "owing to the appearance of cholera in one or two places in the kingdom." When Crieff became a burgh under the Burgh Police (Scotland) Act, Dr. Matthew Gairdner became the first M.O.H., and on his death at the age of 80 his son—Dr. "Jamie"—was appointed in 1880 to his place, and continued to hold the post for the past sixty-two years. Later he took up the study of public health, and got his D.P.H.St. Andrews at the age of 66 in 1912. Dr. Gairdner was a regular reader of the *B.M.J.* and of the *Lancet*. The contamination of bags of sugar with arsenic in a railway truck caused many cases of arsenical poisoning in Crieff in about 1890; Dr. Gairdner contributed an article on it to this *Journal*, and another article on manganese poisoning in 1918. He was at one time a member of the B.M.A., and was greatly pleased that he had had the wisdom to invest in annuities advised by the Association. He was very proud of his age, and was keenly desirous of living to 100.

Dr. CHARLES ARTHUR MORRIS, C.V.O., who died on February 25, was the elder son of the late Frederick William Morris of the Madras Civil Service. He took a first-class in the Natural Sciences Tripos at Cambridge, and graduated M.B. in 1884, afterwards obtaining the M.Ch. degree and the F.R.C.S. He was a student at St. Bartholomew's Hospital, and after holding house appointments there was for some years resident medical officer at the Royal Infirmary, Liverpool. Later he returned to London and settled down in general practice in Belgravia. He and his wife, who greatly assisted him throughout his life, made a host of friends in the neighbourhood of Chester Square, where he practised for many years; he was for over thirty years churchwarden at St. Michael's, Chester Square. He was an officer in the Queen's Westminsters Volunteers and Territorials, and during the Boer War and the last war he was medical officer of King Edward VII Hospital for Officers, founded by the late Miss Agnes Keyser (Sister Agnes). Dr. and Mrs. Morris enjoyed throughout her life a close friendship with Sister Agnes. King Edward VII decorated him with the honour of C.V.O. for his services to the hospital. Dr. Morris had been a member of the British Medical Association for fifty-seven years.

There passed away in Bournemouth on February 26 a lady formerly well known in Edinburgh circles, Mrs. M. K. AITCHISON ROBERTSON, M.D., L.R.C.P.Ed. She received her medical education in Edinburgh, and after qualification she went to Paris, where she studied diseases of the eye under the guidance of Dr. Darier, the well-known oculist. She took up residence in Edinburgh after her marriage and worked as a specialist in ophthalmology. She also carried on a dispensary for these diseases in the Canongate, and this became very popular with the residents there. Later she interested herself in various social and benevolent societies, and during the great war she carried through a great amount of very helpful work, so much so that both husband and wife overwrought themselves to such an extent that they had to retire from medical work and settled in Bournemouth. Mrs. Aitchison Robertson's large circle of friends, in both Edinburgh and Bournemouth, will cherish very happy memories of her gracious presence and intellectual abilities. Her father, George Barclay, was Paris correspondent of the *Times* newspaper for many years, and the degree of LL.D. was conferred on him by the University of St. Andrews; and her eldest brother, Sir Thomas Barclay, was a well-known international lawyer and the chief agent in bringing about the *entente cordiale* between Britain and France.

On March 8 the medical profession in Wandsworth sustained a severe loss by the sudden death of Dr. SIDNEY C. H. BENT, who had been a popular practitioner in that district for 37 years. Dr. Bent qualified from Guy's Hospital in 1902, and thereafter held resident appointments at the Evelina Hospital for Children and the Victoria Hospital, Folkestone. Possessing wide knowledge and sound clinical judgment, and blessed with a happy disposition and kindly nature, he soon built up a large practice, which he loyally left to serve as captain in the R.A.M.C. during the last war. On his return his practice continued to extend and he became a very busy man, yet he had the wonderful faculty of never seeming in a hurry, and was ever ready for a friendly chat. He was much interested in the Bolingbroke Hospital, and many generations of residents of that institution will gratefully remember his friendly hospitality. He was an active member of the board of governors of the hospital, and had been for many years a member of the B.M.A. Bent had a genius for friendship and was beloved by colleagues and patients. He was fond of sport, was regularly seen at Twickenham and Wimbledon, and in his day was a good tennis player and golfer. Yet these were but brief breaks in a life of hard professional work in the populous area in which he lived and from which he refused to move even in the most intense air raid. He will be sadly missed. Bent was singularly happy in his family life, and widespread sympathy will be felt with his widow and daughter.

Medical Notes in Parliament

The White Loaf Goes

Lord SOUTHWOOD, in the House of Lords on March 11, asked whether the Government could state the effect of recent war developments on food supplies.

Lord WOOLTON, in reply, said changes must be made in the national diet which, without detriment to the health of the nation, would set ships free for military purposes. To reduce the tonnage used for transport of wheat the Government had decided to increase to 85% the ratio of flour from wheat milled in this country. They would stop production of white bread, although the nation had made clear that it preferred that bread. From March 23 millers would be prohibited, except under licence, from manufacturing any flour other than national wheatmeal flour or some authorized specialty brown flour. From April 6 it would not be permissible, except under licence, to sell any white bread. From April 20, biscuits, cakes, and flour confectionery would be of the same type of flour as was permitted for bread. From March 23 bakers would be authorized to include up to 25% of white flour with the national wheatmeal. They would not go on to the total of 85% extraction flour until existing stocks of white flour had been used up. It was now possible for him to frame an Order prescribing a more detailed specification for national wheatmeal. He was satisfied they would get a bread good in substance, good in texture, and agreeable to the palate. This would be a pure bread, unlike the standard bread of the last war and vastly superior to it. He added that he proposed limitations on the production of sugar confectionery and biscuits.

Lord HANKEY trusted this reform in the type of bread would be extended as soon as possible to the fighting Forces. He hoped the Ministry of Food would press forward, so far as was consistent in wartime, with the advice of the Medical Research Council that it was an urgent national requirement, especially in early life, to have a much greater consumption of milk and other dairy products, of eggs, vegetables, fruit, and fat fish at the expense of bread, biscuits, sugar, and sweets.

Lord HORDER welcomed the Government's decision. He had never been satisfied that there came back in milk the equivalent of the wheat germ which was fed to cattle. He and his medical colleagues were uniformly of opinion that no other step concerning the nation's food was so calculated as this to raise the level of the nation's nutrition. There was no evidence that 85% extraction flour was indigestible. No evidence was forthcoming in the last war that digestions were disturbed by standard bread of a much poorer quality. In South Africa national wheatmeal was 90% extraction and in Eire 93%. He knew of no diseases of the digestive system, other than those for which bread of any kind was disallowed, in which national wheatmeal might not be given with impunity. Even in cases of gastric and duodenal ulcers, at the stage when bread was approved as part of the diet, national wheatmeal was well tolerated. Evidence was accumulating that the minerals and vitamins in which national wheatmeal was rich were a valuable adjunct in the healing process. The national loaf would be of great benefit to those living behind the poverty line.

Treatment of Prisoners of War in Hong Kong

In the House of Commons on March 10, Mr. EDEN, in the course of his statement on the treatment of military prisoners and civilians by the Japanese Army at Hong Kong, said that all the survivors of the garrison, including Indians, Chinese, and Portuguese, had been herded into a camp consisting of wrecked huts without doors, windows, light, or sanitation. By the end of January 150 cases of dysentery had occurred in the camp, but no drugs or medical facilities were supplied. The dead had to be buried in a corner of the camp. Most of the European residents, including some who were seriously ill, had been interned, and, like the military prisoners, were being given only a little rice and water, and occasional scraps of other food. There was some reason to believe that conditions had slightly improved recently, but the Japanese Government had refused their consent to the visit to Hong Kong of a representative of the Protecting Power, and no permission had yet been granted for such a visit by the representative of the International Red Cross Committee.

Fracture Treatment and Rehabilitation

Mr. BROWN replied to Mr. Isaacs on March 12 that by the arrangements made under the Emergency Hospital Scheme for fracture treatment and rehabilitation, 21 special orthopaedic centres and 56 fracture departments provided a full range of facilities based on the principles recommended by the Delevingne Committee. The other hospitals in the fracture scheme, numbering 200 and known as Fracture Departments B, were limited to ambulant and short-stay cases in wartime because of their geographical position. Many of them attained the Delevingne standard in the facilities which they could offer. All these centres and hospitals, supplemented by numerous outpatient departments and clinics for follow-up care, worked on the principle of continuity of treatment and rehabilitation in one process. No separate rehabilitation centres had been established or were contemplated as part of the scheme administered by the Ministry of Health.

Fruit Juices for Children.—On March 11 Major OWEN asked the Parliamentary Secretary to the Ministry of Food if he was aware that a large number of children were suffering from undernourishment and other ailments in hospitals, hostels, and institutions; and if he was prepared to make or authorize an issue of fruit juices to such children up to the age of 14 as in the case of younger children. Major LLOYD GEORGE said that the present fruit juice distribution scheme would shortly be reviewed, when the claims of different categories of children at present outside the scheme would be considered so far as the supply position permitted of any extension.

Rehabilitation of Miners.—On March 11 Mr. DAVID GRENFELL said he was aware of the excellent work done at the Mansfield Centre of Rehabilitation in the treatment of mining accidents. Another such centre for Durham miners was now being established, towards the cost of which £10,000, or half the total outlay, had been granted by the Miners' Welfare Fund. Facilities for rehabilitation were also provided at some hospitals in mining areas, and the Miners' Welfare Fund had assisted by grants for equipment. In so far as miners were prevented from returning to their former occupation they were within the scope of the Ministry of Labour's interim scheme for the training and resettlement of disabled persons. The progress of schemes of industrial rehabilitation was being carefully watched by his Department, and he would do everything he could to further their development.

Chief Medical Officer's Press Conferences.—On March 12 Mr. ALFRED EDWARDS asked the Minister of Health who was invited to the conferences held by his Chief Medical Officer, and how the selection of persons to whom invitations were sent was made. Mr. BROWN answered that invitations were extended to the editors of the news agencies, the national and provincial newspapers, and medical, technical, women's, and other periodicals interested in public health subjects. No question of economy arose, since the conferences involved no special expenditure, and no written communiqué was distributed. The conferences were informal. Information imparted could not be conveyed by post because much of it was given in answer to questions.

Reductions in Petrol Allowances.—Mr. GEOFFREY LLOYD announced on March 12 that supplementary petrol allowances would be further reduced. The value of the basic ration coupons for May and June would be halved. As from July 1 the basic ration itself would cease. Applications for supplementary allowances to make up for the loss of the basic ration would not be considered except in the case of people who could prove a genuine need. These measures were designed to end pleasure motoring for the present. Mr. Lloyd made no mention of petrol supplies for medical men.

Notes in Brief

Mr. Brown states that expenditure on the Protection of Practices Scheme falling on Insurance Committees is very small, and cannot be separated from their other administration expenses.

Universities and Colleges

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At a meeting of the Council held on March 12, with Sir Alfred Webb-Johnson, President, in the chair, Drs. B. D. Pullinger and R. J. Ludford, members of the scientific staff of the Imperial Cancer Research Fund, were appointed lecturers in the College in 1942. Votes of thanks were given to Mr. R. H. Jocelyn Swan for a collection of urological specimens, and to Mrs. Earle Newton for some furniture designed and hand-made by her late husband, Earle Newton, F.R.C.S.

Diplomas of Fellowship were granted to John Marshall Pullan, M.B.Camb., and Michael Vincent Sheehan, M.B.N.U.I. A diploma of Membership was granted to Audrey Coglan.

Diplomas were granted, jointly with the Royal College of Physicians of London, as follows:

TROPICAL MEDICINE AND HYGIENE.—L. J. L. Chwatt, O. L. C. Cookson, Adelia A. M. Coutts, D. W. Ellis-Jones, A. G. Farr, E. I. Garratt, K. E. A. U. Ground, J. R. Jackson, C. Michie, F. G. Pattrick, A. R. Sandford, Marion K. Serjeant, J. P. Sexton, J. Shah, K. N. Sinha, L. P. Studzinski, W. J.-S. Wilson.

OPHTHALMIC MEDICINE AND SURGERY.—P. H. Beattie, P. C. Bose, E. R. Bowes, D. Caplan, G. B. Collyer, M. M. J. Enright, H. de B. Kempthorne, Iris M. Magauran, G. C. Pritchard, P. D. Trevor-Roper, R. D. Ward, A. E. Wilson.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* a rise in the incidence of measles was again recorded during the week under review. The most notable local increase was in Warwickshire, where the cases rose from 121 in the preceding week to 248, the centres of infection being Birmingham C.B. 145 cases, Coventry C.B. 42, and Solihull U.D. 53. Other counties with a high incidence were Lancashire 346 (Oldham C.B. 84, Prestwich M.B. 58); Surrey, with 339 cases fairly generally distributed throughout the county; London 178 (Fulham 55); Middlesex 177 (Harrow U.D. 57).

The notifications of whooping-cough went up by 104 during the week. No very big changes occurred in the totals for the individual counties, the largest increases being those of Kent, Middlesex, Lancashire, and Yorks West Riding.

The higher incidence of pneumonia—the notifications were 152 more than in the previous week—was distributed generally throughout the country.

There were no fresh local outbreaks of dysentery during the week, but increased totals were reported from Glamorganshire, Cardiff C.B. 21 cases; Dorsetshire, Dorchester R.D. 11 cases; Yorks West Riding, Harrogate M.B. 8 cases. The notifications were slightly higher in Lancashire, where 17 cases in seven administrative areas were notified, and London, with 14 cases from 8 boroughs.

In *Scotland* the incidence of diphtheria, scarlet fever, and whooping-cough fell, but there were 48 more cases of measles than in the preceding week, seven-tenths of the total cases in the country being recorded in Edinburgh.

Report of the Registrar-General for Eire, 1940

The number of deaths registered during 1940 was 41,885, equivalent to a rate of 14.16 per 1,000 of the population; the average for the decennial period 1930-9 was 14.18. The registered births numbered 56,594, yielding a birth rate of 19.1, compared with 19.4 for the average of the preceding decennial period.

Infant mortality was 66 per 1,000 births, compared with an average of 69 for the period 1930-9. The maternal mortality was 4.01 per 1,000 registered births, compared with an average of 4.82 for the preceding decennial period.

The death rate from tuberculosis, 128 per 100,000, was slightly above the average of 122 per 100,000 recorded in the preceding ten years. The rate for 1940 for males was 128 and for females 121, compared with an average of 121 for males and 122 for females during the period 1930-9.

Deaths from the common infectious diseases of childhood were only half of the average; 451 deaths were recorded in 1940, compared with an average of 846 in the preceding decennial period.

Returns for the Week Ending March 7

The number of cases of infectious diseases notified during the week in England and Wales included scarlet fever 1,231, whooping-cough 1,290, diphtheria 876, measles 2,550, pneumonia 1,276, cerebrospinal fever 218, dysentery 120, paratyphoid fever 12, typhoid fever 10. Deaths attributed to influenza in the great towns numbered 62.

No. 8

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended February 28.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London), (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1942					1941 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	164	18	35	2	9	400	22	97	1	17
Deaths		5	1				3	7		
Diphtheria	859	25	213	53	14	1,014	50	334	25	34
Deaths	22	1	2	1	1	41	1	13	1	1
Dysentery	131	14	57	—		179	17	25	3	—
Deaths		3	—	—			—	—		—
Encephalitis lethargica, acute	4	1	—	1	—	4	2	2		—
Deaths		—					—			
Enteric (typhoid and paratyphoid) fever						18	—	1	6	—
Deaths						1	—	—	—	—
Erysipelas			47	6	3			52	4	—
Deaths		—					2			
Infective enteritis or diarrhoea under 2 years										
Deaths	28	1	6	12	—	40	2	12	2	1
Measles	2,335	178	196	85	8	15,334	325	159		23
Deaths	7	1	—	—	1	19	2	—	1	—
Ophthalmia neonatorum	72	4	20		—	87	7	12		—
Deaths										
Paratyphoid fever	2	—	2	—						
Deaths	—	—	2	—						
Pneumonia, influenzal*	1,148	59	17	3	3	1,647	65	43	17	8
Deaths (from influenza)	74	9	10	1	2	267	20	15	6	10
Pneumonia, primary			292	19				458	23	
Deaths		50		13	12		—		14	19
Polio-encephalitis, acute	1	—				2	1			
Deaths		—					—			
Poliomyelitis, acute	8	—	—	—	1	11	—	1	—	—
Deaths		—	—				—	—		
Puerperal fever	—	—	15	2	—	1	1	13	1	—
Deaths										
Puerperal pyrexia	175	19	23		1	146	9	12		—
Deaths										
Relapsing fever	—	—			—	1	—			—
Deaths										
Scarlet fever	1,124	38	170	68†	28	1,300	62	170	30	20
Deaths	—	—	1	—	—	—	—	—	—	—
Small-pox	—	—	—	—	—	—	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhoid fever‡	6	2	—	5	2					
Deaths	—	—	—	—	—					
Typhus fever	—	—	—	—	—	—	—	—	2	—
Deaths			—	—	—			—	—	—
Whooping-cough	1,315	129	43	20	6	3,248	67	690	—	17
Deaths	12	3	—	—	—	42	2	19	1	1
Deaths (0–1 year)	394	36	65	32	23	478	36	137	39	26
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,836	888	752	257	171	7,150	921	888	279	244
Annual death rate (per 1,000 persons living)			16·9	17·2	§			19·3	18·5	21·4
Live births	5,495	548	845	236	254	5,157	392	859	361	210
Annual rate per 1,000 persons living			17·5	15·8	§			17·4	24·0	18·4
Stillbirths	232	27	32			208	12	51		
Rate per 1,000 total births (including stillborn)			36					56·0		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Includes 2 cases of mixed infection—diphtheria and scarlet fever.

‡ Includes paratyphoid A and B for Northern Ireland.

§ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

Medical News

The Minister of Health has appointed Dr. F. Murchie to be Deputy Director-General of the Emergency Medical Services.

Prof. F. J. Browne will deliver a B.M.A. Lecture on "Toxaemias of Late Pregnancy" before the Swansea Division of the British Medical Association at Mackworth Hotel, Swansea, on Wednesday, March 25, at 1 p.m.

Wing-Com. R. R. Trail will deliver a lecture on "Tuberculosis in Relation to the War" at Weston Hotel, Bath, on Thursday, March 26, at 5.30 p.m. All Service medical officers and civilian practitioners will be welcome.

A meeting of the Medico-Legal Society will be held at 26, Portland Place, W., on Thursday, March 26, at 5 p.m., when Dr. Donald C. Norris will read a paper on "Personal Injury by Accident: Some Medico-Legal Problems."

The Ministry of Food announces that doctors may give a certificate for a provisional allowance of two extra rations of soap a week to a patient who has had a colostomy. The patient should present the certificate, which need not be on any special form, at the Food Office. The needs of invalids in this matter are being considered.

According to the *Times* of March 16, Mr. Gordon King, F.R.C.S., professor of obstetrics and gynaecology in the University of Hong Kong, has escaped from the island and has arrived in Free China.

The Princess Royal took the chair at the annual meeting of the governors of the Harrogate and District General Hospital, after being elected president on the proposition of Dr. W. Edgecombe, who was re-elected deputy president. Her Royal Highness said that her interest in the hospital was no new thing, because she laid the foundation stone of the new building in 1926, opened it in 1932, and the maternity ward in 1938, and she could fully claim to have been associated with each stage of its development and progress.

After a hearing that lasted three days at the Surrey Assizes, William Spencer Lewis, L.S.A., with addresses in London and Egham, was sentenced to three years' penal servitude for performing illegal operations on women with intent to procure miscarriages. The offences were alleged to have taken place at Egham on dates between January, 1940, and November, 1941. Passing sentence, Mr. Justice Lawrence said he had taken into consideration the facts of Dr. Lewis's age and that this was the first time he had been convicted. He would also have to pay the costs of the prosecution.

The Scottish Education Department announces that two-thirds of a pint of milk a day will be available for children in grant-aided schools from March 15. This restores the one-third of a pint which was deducted in January owing to the fall in milk supplies.

Prof. C. Lovatt Evans, F.R.S., Jodrell Professor of Physiology at University College, London, has been elected an honorary member of the Sociedad Argentina de Biologia.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Phenothiazine for Threadworms

"INTERESTED" writes: In view of the increasing use of phenothiazine as a vermicide, and the possibility of dangers therefrom, I should like to record the experiences of a patient of my own. On her own initiative she took this drug, in the maximum doses advised, for a period of eight days, and afterwards described the following signs and symptoms: bile-stained urine (later strawberry-pink staining); slight icterus (family said she "looked yellow"); gradually increasing nausea; and gradually increasing breathlessness even on slight exertion, with palpitation, faintness, and shooting pains in the arms and legs. The oxyurides disappeared for a week or two but returned, and she sought medical advice. She was anaemic, and 2 c.cm. of liver extract, with iron by the mouth, had good effect, the drug being forbidden in future. She is now undergoing a successful cure solely by following the regime of disinfestation described by Sir William MacArthur and others.

Difficult Skin Case

Dr. H. S. RUSSELL (Shipley) writes: A fulminating discoid dermatitis mainly affecting the left side would suggest the possibility of a self-inflicted injury. Has Dr. A. E. Druitt (Jan. 24, p. 135) considered this?

LETTERS, NOTES, ETC.

Association of Austrian Doctors in Great Britain

Dr. A. HAMMERMANN (Eastern Hospital, Homerton Grove, E.9) writes: It might be of interest to readers of the *B.M.J.* to hear about the setting up of the Association of Austrian Doctors in Great Britain under the chairmanship of Prof. Silberstein, from Vienna University. We want to continue the noble traditions of the Vienna Medical School in the spirit of scientific progress of Pirquet, Wenckebach, Chvostek, Landsteiner, etc. Our association, affiliated to the Free Austrian Movement, aims to make all our colleagues participate in the war effort of Great Britain and her allies and at such places where their skill is most needed. We endeavour to collaborate with all medical organizations and individual representatives of British medicine. From obvious reasons we Austrians, the first victims of Nazi oppression, are willing to do our utmost to help the Allied cause. More than half of the 360 Austrian doctors in this country are already engaged in work of national importance, in hospitals and other institutions all over the country. But still a big number—about 160—are not yet participating in the war effort. Already Prof. S. Wright of Middlesex Medical School, Prof. Bedson, and others have expressed their readiness to help us. Any suggestions from your readers will be highly appreciated. We are holding meetings periodically, where we hope to welcome British friends.

Rehabilitation of Tuberculous Patients

The Chairman of the Spero Fund for the Industrial Welfare of Tuberculous Persons writes: Dr. Andrew Morland's letter (February 7, p. 197) stresses the need for supplementing wages of tuberculous individuals who, we hope, are to be rehabilitated under the Government's new scheme. There is no doubt that he is right and has touched the vital spot of all rehabilitation work. If the Ministry of Labour wishes to carry into effect immediately the promise of its Minister not to omit the tuberculous from its scheme, advantage could be taken of the Spero Workshops, which are at present managed by the committee of the Spero Fund for the Industrial Welfare of Tuberculous Workers. That organization has a factory capable of employing over 100 workers in Tower Bridge Road, well equipped for cabinet-making, woodwork, leather work, and wood-chopping. Abundant orders are in hand, but cannot be executed owing to lack of employees. This is due to the employment in normal industry of ex-sanatorium patients at work which is often most unsuitable and under conditions which are a danger both to the individual employed and his co-workers. In common with all schemes for the employment of the tuberculous, a subsidy is needed if adequate wages are to be paid and the production deficiency due to the workers' disability covered. The machinery is all there, and it only remains for the Ministry to set it in motion, and thereby assist the Spero Committee to employ many tuberculous individuals under good conditions and medical care. We all await the realization of the hopeful promise of the Minister of Labour, and the organization is all ready to be taken over for that purpose.

Medical Equipment for Russia

At the Finsbury Health Centre an exhibition illustrating Soviet public medicine in peace and in war has been staged, not so much to inform the public about Russian health services as to assist Finsbury's Aid-to-Russia Fund, by means of which it is hoped to provide at least one fully equipped mobile *x*-ray unit for the Russian front. Apart from the familiar posters and photographs illustrating Russian achievements, the component parts of the *x*-ray unit were on view, wanting only the ambulance to house them. Lord Horder, who opened the exhibition, said that the war had paralysed almost completely the advances that were being made in medicine. Such advances as continued related only to war medicine. The only chance of further progress lay in getting on with the war and ending it as soon as possible. That was the reason for helping Russia in her life-and-death struggle. Every time an injured Russian soldier was made fit again it was bringing nearer the end of the war. He added that he had inspected the mobile *x*-ray equipment, and that it was as good as a large number of the installations up and down the country which were fixtures in hospital *x*-ray departments